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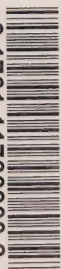
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Discussion Paper

THE DETERMINANTS OF CONTRACT DURATION

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DISCUSSION PAPER

THE DETERMINANTS OF CONTRACT DURATION

by

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Economics and Industrial
Relations Research Branch

Direction de l'économie et
de la recherche en relations
industrielles

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PREFACE

Research and analysis concerning the terms and conditions of collective agreements have predominately focussed on the size of wage increases negotiated. These investigations of wage determination, whether institutional or quantitative in character, have recognized that staggered wage contracts may affect the speed with which wage settlements adjust to changing economic conditions. However, relatively little attention has been paid to contract duration and the factors which influence its variability. This study, completed under contract by Professor L. Christofides, investigates the determinants of contract duration from 1966 to 1981 using Labour Canada's wage settlement data.

Following a brief overview of differences in contract duration in selected industrialized countries, Professor Christofides examines the cross-sectional and time-series aspects of contract duration in Canada. He then proceeds with a review of the theoretical literature and investigates empirically the main determinants of contract length. He concludes that over the sample period, only 14 per cent of contracts were consistently of the same duration and that variability of contract duration across sectors may be attributable to differential costs of negotiating agreements. The empirical results also suggest that inflation uncertainty and the Anti-Inflation Program shortened contract length significantly.

The general policy implication arising from this study is that the speed of response to new policies and their impact on the economy are related to the average length of contracts. In the Canadian situation, with relatively long contract duration, the employment effects of policy changes will tend to be experienced before the wages adjust. Disinflationary policies will therefore tend to increase unemployment before wages respond -- unless the policy shortens contract length as it did in the Anti-Inflation Program. On the other hand, if contracts remain relatively long, reflationary policies will increase employment before wages accelerate.



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SECTION ONE

INTRODUCTION

While various aspects of labour market behaviour have received a great deal of theoretical and empirical attention, the subject of contract duration remains almost entirely unexplored. It has been presumed, possibly, that agents follow habitual patterns in this regard, always signing contracts of the same duration. Cross-sectional variation in contract duration might be explained by the ubiquitous concept of transactions costs, viz., parties which find it costly and difficult to reach an agreement, or for whom the prospect of frequent industrial unrest and work stoppage is exceedingly worrisome, write long-term contracts.

However, two general developments have brought the question of contract duration to the forefront of macroeconomic thinking. The first arose from theoretical work which changed dramatically macroeconomic model building and policy evaluation. The idea that economic agents form expectations about future values of relevant variables "rationally", that is using economic theory and all available information,¹ combined with the so called "Lucas supply function",² produced two startling results: (i) the "policy evaluation proposition", which argues that the structure of the economy is not invariable with respect to policy initiatives, and (ii) the "policy ineffectiveness proposition", which suggests that output cannot possibly be affected by fiscal or monetary policy. This literature was reexamined by Fischer (1977) and Taylor (1979), among others, who concluded that under certain conditions policy intervention may still be valuable. Fischer's and Taylor's rehabilitation of a role for policy intervention depends critically on their realistic assumption that the labour market is riddled with long-term overlapping wage contracts. Such contracts freeze the terms at which labour is traded and prevent agents from anticipating new policy initiatives, thereby restoring policy effectiveness. Fischer's and Taylor's work has stimulated a number of theoretical inquiries into the subject of contract duration, e.g., Gray (1978) and Canzoneri (1980). Thus, theoretical discourse has restored interest in institutional characteristics of the labour market such as contract duration.

¹An example of expectations formation which is not "rational" is the use of arbitrary distributed lags, or past values, of the relevant variables. Instead of using economic theory to construct the expected value of a variable conditional on existing information, non-rational expectations formation involves picking past values of the variable as a proxy for its future values.

²In this supply function, it is assumed that actual output responds to expectational errors in the price level: unanticipated price increases stimulate production. The reader is referred to McCallum's (1980) excellent survey for more information on the rational expectations literature.

A second, related, reason why contract duration is now on the minds of a number of economists is the deep and prolonged nature of the current recession in both Canada and the U.S. It is argued, for instance, that

Our labour markets ... are based on ... contracts of one to three years ... (which are) decentralized and overlapping These features together imply a slow response of wages and prices to slack in demand. In other countries where industrial relations are not as adversarial as in North America, 'social contracts' are bargained centrally and incorporate macroeconomic considerations. Downward wage and price adjustments there are accompanied by much less unemployment and are accomplished faster.³

Similar sentiments are shared by Mitchell (1982, pp. 20-22), while at least one U.S. commentator has gone as far as to argue that long term contracts should be made illegal.⁴

Despite this increased interest in the duration of labour market contracts, there appear to be no empirical studies on the subject in either Canada or the U.S. Thus, a number of interesting questions remain entirely unexplored: Do labour contracts vary between areas of economic activity and over time? To what extent do negotiating units sign contracts of the same duration over time? If duration varies, to what might this variance be attributed? Does inflation uncertainty affect duration? Do wage and price controls affect aspects of labour market behaviour other than wage rates? If so, what is the implication of this for the conduct of policy during periods of wage controls? It is the aim of this study to address these and other related questions.

The study begins with an overview of contract duration practices in a number of industrialized countries. Our present patterns are shown, in section two, to date back to the mid-1950s, when a marked increase in contract duration occurred. The main body of this study begins, in section three, with an examination of the cross-sectional characteristics of a sample of over 8,000 agreements reached in the Canadian unionized sector, in both the private and public sectors between the fourth quarter of 1966 and the third quarter of 1981. The time-series aspects of the sample are examined in section four from two vantage points. First, contract duration practices in three sub-periods of interest are considered, namely the period 1966Q4 to 1975Q3, the period during which the Anti-Inflation Board (AIB) was in effect (1975Q4-1978Q3), and the post-AIB period. As well, wage chronologies are constructed; that is, the sequence of contracts written by particular bargaining groups is considered. It is found that, where a number of such contracts have been written, contract duration was unchanged

³Fortin (1982, pp. 19-20)

⁴See the comments attributed to B. Bosworth in A. Freedman (1982).

in only 14 percent of these bargaining groups. In most instances, contract duration was an obviously endogenous variable. The theoretical literature dealing with contract duration is reviewed in section five, along with some preliminary empirical studies of the determinants of contract length. In the following section, regression analysis techniques are applied to the individual contract data with a view to explaining cross-sectional variations in contract duration, as well as changes which have occurred over time. To anticipate some of the discussion in this section, it is found that inflation uncertainty has a substantial and statistically significant effect on contract duration. It is also reported that Canada's experiment with wage and price controls had an unanticipated impact on contract duration; it declined during the period 1975Q4-1978Q3. This effect is independent of the impact of inflation uncertainty on contract duration.

Summaries of our findings are presented at the end of each section. Our major results are collected in the final section, where various policy implications of this work are also discussed.

SECTION TWO

AN HISTORICAL PERSPECTIVE AND SOME INTERNATIONAL COMPARISONS

The nature of labour market contracts varies tremendously across national boundaries. In some countries, e.g., Canada and U.S.A., labour contracts are documents of remarkable coverage and complexity. The typical contract specifies effective and expiry dates, the dates on which wage increases will occur and whether such increases are contingent. If contingent wage increases are included, the contract spells out the circumstances under which wages will be revised and the extent of these revisions. Finally, contracts contain detailed provisions regarding sick leave, holidays and other pecuniary and non-pecuniary benefits. In other countries, by contrast, separate agreements may be concluded regarding wage issues and benefits. In Japan, for instance, wage negotiations tend to occur annually, while benefit discussions are somewhat less frequent. Finally, there are countries, like the U.K., where labour market contracts are rather provisional and lacking in legal authority.

Contractual arrangements in general and contract duration in particular are reasonably similar in the labour markets of Canada and the U.S. Contracts of longer duration than one year existed in both countries even before World War II, but it was not until the 1950s that they became really popular. A major event in the development of the concept of the long-term contract in both countries was the agreement reached in the U.S. between General Motors and the United Auto Workers in 1948. This two-year agreement provided GM employees with (i) an increase designed to restore real wages to their 1940 levels, (ii) increases designed to share productivity gains, and (iii) a cost of living allowance (COLA) clause. The third provision has been regarded as the sine qua non of long-term contracts⁵ and the increasing acceptance of COLA provisions during the 1950s went hand-in-hand with the lengthening of labour market contracts. When the GM-UAW agreement expired in 1950, it was replaced with a five-year contract. A similar contract was signed, in the same year, by GM and UAW in Canada.

During the next few years contract duration increased gradually in both Canada and the U.S.⁶ Unfortunately, information on contract duration

⁵See Garbarino (1962), Macdonald (1967), Gorbet (1968) and Samlalsingh (1968).

⁶"The typical contract negotiated during the early post-war years was an agreement with a one-year term.... This appeared to continue the practice that had been most common in the pre-war period.... Within a few years a clear-cut trend away from one-year contracts could be detected. In a survey of agreements negotiated in 1948, the Bureau of National Affairs found that some 25 percent of them were multi-year contracts. This proportion... was probably not different from that prevailing before the War. But by 1950... this proportion... (was)... 55 percent... and by 1952 the figure was 69 percent. In 1957 the figure was 81 percent and, by 1960, the near saturation point of 87 percent was reached." Garbarino (1962), pp. 74-75.

is available in somewhat different form for the two countries. In the U.S. (Tables 1 to 4), information on contract duration refers to the mean duration of all existing agreements, while in Canada (Tables 5 and 6) data on contract length is available with respect to new wage settlements.

As can be seen from Table 1, U.S. contract length increased dramatically during the 1950s. In 1954, for instance, the most popular contract duration was 24 to 35 months. By 1958, 50 percent of existing agreements were of three or more years. Between 1958 and 1960, contract duration in existing agreements shortened somewhat, but it increased again by 1962.

More recent and complete information on U.S. contract duration is contained in a series of seven Bureau of Labor Statistics publications.⁷ This information is summarized in Tables 2 to 4 below. As in Table 1, Tables 2 to 4 show contract duration information on major agreements in effect as of the last day of the month shown. By the 1970s the term "major" came to refer to agreements involving 1,000 or more employees. Some 1,500 contracts,⁸ involving six to seven million employees, were considered. As shown in Table 2, where data on all industries is presented, the number of contracts with duration equal to at least three years increased⁹ to 72.6 percent by July 31, 1972. However, during the inflationary years of 1973 and 1974, this proportion declined to 66.9 percent and 63.8 percent respectively.¹⁰ Thereafter, it increased continuously, reaching 74.2 percent by January 31, 1980. A similar pattern can be detected in the less aggregated data of Tables 3 and 4. As in Table 2, the mode continues to be three or more years in both sub-sectors. The decline in the percentage of contracts of three or more years duration is most dramatic in the non-manufacturing sector -- from 74.8 percent on July 31, 1972, down to 56.3 percent by July 31, 1974. The manufacturing sector registered its largest decrease between July 31, 1972, and July 31, 1973 -- from 71 percent

⁷See "Characteristics of Agreements Covering 1,000 workers or more", U.S. Department of Labor, BLS Bulletins 1784, 1822, 1888, 1957, 2013, 2065 and 2095.

⁸These represent about two thirds of all contracts of this size on file with the BLS for July 1972 and 1973, three quarters of contracts on file for July 1974, 1975 and 1976 and over four fifths of contracts available for January 1978 and 1980.

⁹It should be recalled that Table 1 contains information on larger units (5,000 or more employees), which are more likely to have long contracts. When smaller units are considered (i.e., 1,000 or more employees) the percentage of contracts of three or more years duration was only 40 percent in 1961. See Monthly Labor Review, October 1962, pp. 1136-43. The increase to 72.6 percent by July 31, 1972 is, therefore, all the more remarkable.

¹⁰One of the points to be investigated in this study is the extent to which contract duration responds in a predictable fashion to inflation uncertainty. It will be seen that uncertainty in the Canadian inflation rate exerts a depressing effect on contract length.

TABLE 1

USA: DURATION OF MAJOR* UNION CONTRACTS IN EFFECT

	Less than 24 months		24-35 months		36 months or more		Total
	Contracts	%	Contracts	%	Contracts	%	Contracts
Oct. 31, 1954	94	34.8	106	39.3	70	25.9	270
Jan. 31, 1958	30	11.5	101	38.5	131	50.0	262
Jan. 31, 1959	44	15.5	109	38.5	130	46.0	283
Jan. 31, 1960	45	18.3	95	38.6	106	43.1	246
Jan. 31, 1961	25	8.8	124	43.5	136	47.7	285
Jan. 31, 1962	24	8.5	97	34.3	162	57.2	282

Source: 1954 Data: BLS Report #75, Expiration Reopening and Wage Adjustment Provisions of Major Agreements, p. 3.

1958-62 Data: Monthly Labor Review, January 1958, December 1958, December 1959, December 1960, December 1961.

Quoted in Gorbet (1968)

*Defined as contracts involving more than 5,000 employees.

to 68.4 percent. By January 31, 1980, these proportions increased to 77.3 percent and 71.2 percent in the manufacturing and non-manufacturing sectors.

Information on Canadian contract duration is contained in Tables 5 and 6. Table 5, like Table 1, deals with the 1950s and early 1960s and is constructed from information in Gorbet (1968). Table 6, which was designed to provide continuity, was constructed from data made available by Labour Canada. Both Tables 5 and 6 differ from the U.S. ones in that they deal with new settlements covering 500 or more employees. Table 5 documents the remarkable lengthening of wage contracts that occurred during the 1950s. In 1953, for instance, only 2.6 percent of new agreements were for 34 months or more. Ten years later, this percentage stood at 23.9 percent. Similarly, the percentage of new contracts of 22 to 33 months duration increased from 25.8 percent in 1953 to 56.4 percent in 1963. Table 6 indicates that the 1963 position was, roughly speaking, maintained until 1974. At that point a dramatic decrease in duration set in which appeared to last until 1979. One of the aims of this study is to investigate these recent developments in contract duration practices.

TABLE 2

USA: DURATION OF MAJOR* UNION CONTRACTS IN EFFECT: ALL INDUSTRIES

	Less than 24 months			24-35 months			36 + months			Total	
	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.
July 1972	55	141	4.2	301	1,722	23.2	944	4,450	72.6	1,300	6,313
July 1973	90	317	6.7	354	2,016	26.4	895	4,390	66.9	1,339	6,723
July 1974	87	229	5.6	475	2,434	30.6	988	4,555	63.8	1,550	7,218
July 1975	83	259	5.5	416	2,291	27.5	1,015	4,520	67.0	1,514	7,070
July 1976	74	235	4.7	402	1,855	25.6	1,094	4,652	69.7	1,570	6,742
Jan. 1978	33	98	2.1	365	1,895	23.8	1,138	5,061	74.1	1,536	7,054
Jan. 1980	34	91	2.2	366	1,269	23.6	1,150	5,234	74.2	1,550	6,594

Emp. = Employees in thousands

* Defined as contracts involving more than 1,000 employees.

Source: Bureau of Labor Statistics.

TABLE 3

USA: DURATION OF MAJOR* UNION CONTRACTS IN EFFECT: MANUFACTURING

	Less than 24 months			24-35 months			36 + months			Total	
	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.
July 1972	26	65	3.5	190	1,350	25.5	530	2,120	71.0	746	3,535
July 1973	28	60	3.9	200	1,410	27.7	495	1,998	68.4	723	3,468
July 1974	21	36	2.6	217	1,281	26.9	570	2,464	70.5	808	3,781
July 1975	28	71	3.4	193	1,167	23.7	594	2,512	72.9	815	3,750
July 1976	32	86	3.9	198	1,221	24.0	596	2,091	72.1	826	3,398
Jan. 1978	12	39	1.6	179	1,285	23.2	579	2,053	75.2	770	3,377
Jan. 1980	12	36	1.6	158	642	21.1	580	2,348	77.3	750	3,026

Emp. = Employees in thousands

* Defined as contracts involving more than 1,000 employees.

Source: Bureau of Labor Statistics.

TABLE 4

USA: DURATION OF MAJOR* UNION CONTRACTS IN EFFECT: NON-MANUFACTURING

	Less than 24 months			24-35 months			36 + months			Total	
	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.
July 1972	29	75	5.2	111	372	20.0	414	2,330	74.8	554	2,777
July 1973	62	258	10.1	154	606	25.0	400	2,391	64.9	616	3,255
July 1974	66	192	8.9	258	1,153	34.8	418	2,091	56.3	742	3,436
July 1975	55	187	7.9	223	1,124	31.9	421	2,008	60.2	699	3,319
July 1976	42	149	5.6	204	635	27.4	498	2,561	67.0	744	3,345
Jan. 1978	21	59	2.7	186	610	24.3	559	3,009	73.0	766	3,678
Jan. 1980	22	56	2.8	208	627	26.0	570	2,886	71.2	800	3,569

Emp. = Employees in thousands

* Defined as contracts involving more than 1,000 employees.

Source: Bureau of Labor Statistics.

This remarkable lengthening in the duration of North American wage contracts does not seem to have been paralleled in other industrialized nations. In Japan, for instance, collective bargaining is dominated by the annual spring offensive during which nearly 80 percent of organized labour goes into wage negotiations.¹¹ A second difference is that while North American contracts include provisions for benefits as well as wages, contracts arrived at in Japan during the spring offensive often address just wage issues, with benefits being negotiated in separate, less frequent, negotiations. The concept of contract duration does not, therefore, have an unambiguous meaning in that country.¹²

¹¹ Labor Unions and Labor-Management Relations, Japanese Industrial Relations Series (The Japan Institute of Labor, 1979).

¹² "The Spring Labor Offensive tradition is firmly established in our society and is a unique system for wage negotiations. It started in 1955, and was staged on a large scale from 1956 on.... Today nearly 80 percent of organized labor goes into wage negotiations at the time of the Spring Labor Offensive". And "It is quite common for wage agreements to be concluded separately from other matters. According to a Labor Ministry Survey, 83 percent of firms with labor agreements have concluded wage agreements separately with respective labor unions.... Negotiations on comprehensive labor agreements are held at other occasions". Japanese Industrial Relations Series #2, 1979, The Japan Institute of Labor, p. 6 and pp. 20-21.

TABLE 5

CANADA: CONTRACT DURATION OF NEW WAGE AGREEMENTS*: 1953-1966

	Less than 22 months		22-33 months		34 months or more		Total
	Con- tracts	% of Contracts	Con- tracts	% of Contracts	Con- tracts	% of Contracts	Contracts
1953	111	71.6	40	25.8	4	2.6	155
1954	106	67.9	46	29.5	4	2.6	156
1955	142	72.4	48	24.5	6	3.1	196
1956	79	36.9	110	51.4	25	11.7	214
1957	71	47.3	64	42.6	15	10.1	150
1958	63	37.7	89	53.3	15	9.0	167
1959	55	28.8	102	53.4	34	17.8	191
1960	66	39.3	79	47.0	23	13.7	168
1961	76	38.6	88	44.6	33	16.8	197
1962	63	31.2	83	41.1	56	27.7	202
1963	37	19.7	106	56.4	45	23.9	188
1964	35	22.0	83	52.2	41	25.8	159
1965	26	13.8	72	38.1	91	48.1	189
1966**	10	14.7	33	48.5	25	36.8	68

*These involve 500 or more employees.

**First three quarters.

Source: Department of Labour; Quoted by Gorbet (1968) (No employment figures were available).

TABLE 6

CANADA: CONTRACT DURATION OF NEW WAGE AGREEMENTS*: 1967-1981

	Less than 22 months			22-33 months			34 months or more			Total	
	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.	% of Con- tracts	Con- tracts	Emp.
1967	53	97	23.3	112	130	49.3	62	169	27.4	227	396
1968	61	174	19.1	166	336	52.0	92	202	28.9	319	712
1969	77	171	21.4	187	415	52.1	95	213	26.5	359	799
1970	65	104	19.7	180	348	54.5	85	141	25.8	330	593
1971	76	101	21.1	189	370	52.5	95	191	26.4	360	662
1972	77	118	20.3	198	329	52.1	105	348	27.6	380	795
1973	68	131	17.7	230	377	59.9	86	169	22.4	384	677
1974	150	364	35.1	224	508	52.3	54	62	12.6	428	934
1975	211	331	50.9	164	312	39.5	40	115	9.6	415	758
1976	330	686	51.7	193	356	30.3	115	365	18.0	638	1,407
1977	401	752	69.5	138	247	23.9	38	44	6.6	577	1,043
1978	358	684	52.9	260	522	38.4	59	99	8.7	677	1,305
1979	196	344	34.8	265	447	47.0	103	332	18.2	564	1,123
1980	144	338	25.8	289	497	51.8	125	380	22.4	558	1,215
1981	155	307	31.4	263	467	53.2	76	117	15.4	494	891

*These involve 500, or more, employees.
Emp. = Employees in thousands.

Source: Labour Canada.

Short-term contracts also appear to be the rule in West Germany. As Table 7 indicates, most employees enter one-year contracts with only a negligible number signing substantially longer (or shorter) contracts. In 1980, for example, 92.6 percent of all employees under contract had entered into one-year agreements. This percentage appears not to have changed appreciably since 1976, the earliest year for which this publication could be obtained.

Finally, in the United Kingdom wage agreements not only tend to be of a short-term nature but they are not legally binding.¹³ Contract duration is, therefore, rather ambiguous.¹⁴

This brief description of the evolution of contract duration arrangements in Canada and the comparisons with similar practices in other industrialized nations set the stage for a more detailed examination of recent Canadian experience. The remaining sections of this monograph analyze a set of individual contract data drawn from the Canadian unionized sector. Some 8,000 agreements from both the private and public sectors, are investigated. This remarkable data base, compiled by Labour Canada, extends as far back as the fourth quarter of 1966 and covers the period to 1981Q3.¹⁵

In the remaining sections of this study this sample of labour market agreements is examined from a number of different perspectives, beginning, in section three, with its cross-sectional characteristics.

¹³It should be emphasized that although North American contracts are occasionally reopened, this is the exception rather than the rule. It follows, therefore, that any information reported on contract duration is meaningful.

¹⁴"Collective bargaining agreements in the British industrial relations system are not legally binding contracts so that, unlike the unionized sector in the United States, the interval between wage settlements is not predetermined by the most recent agreement. On the contrary, negotiations toward a new wage settlement may be initiated in any quarter."
J. Pencavel, "The Effects of Incomes Policies on the Frequency and Size of Wage Changes", Economica, 49, (May) 1982, p. 148.

¹⁵This sample has a wider coverage than Table 6, in that it includes contracts with 200 or more employees (not 500 or more employees as in Table 6). Two caveats should be made about this data. The first is that, after 1978, the coverage of contracts covering fewer than 500 employees can be somewhat spotty. The second is that in the case of these small contracts the identification of contracts with COLA clauses is not always thorough. This information was used in a number of earlier occasions in collaboration with D.A. Wilton. However, because the focus of this study is contract duration, rather than wage determination, pre-AIB contracts and public sector AIB contracts signed by a single unit at a particular point were merged. Hence my sample is somewhat smaller than was used on earlier occasions.

TABLE 7

FEDERAL REPUBLIC OF GERMANY
NUMBER OF EMPLOYEES (000s) UNDER CONTRACT, BY DURATION

	1976		1979		1980	
	Employees	%	Employees	%	Employees	%
10 Months or Less	488	2.9	108	0.6	94	0.5
11 Months	632	3.8	391	2.3	1,157	6.5
12 Months	14,872	89.2	11,064	66.0	16,607	92.6
13 Months	34	0.2	5,001	29.8	15	0.1
14 Months	442	2.7	59	0.4	16	0.1
15 Months or More	82	0.5	59	0.4	9	0.0
Unrestricted	116	0.7	76	0.5	34	0.2
Total	16,666	100	16,758	100	17,932	100

Source: WSI Mitteilungen, März 1977, 1980, 1981.

SECTION THREE

THE CROSS-SECTIONAL VARIATION IN CONTRACT DURATION

The data on collective bargaining agreements referred to at the end of section two contain information on the duration of each contract agreement reported.¹⁶ This information can be analyzed both cross-sectionally and over time. In this chapter some cross-sectional aspects of the data are considered.

Table 8 shows some basic statistics regarding the sample. As the ninth column shows, average contract duration in this sample of 8,128 contracts equals 21.9 months, with values ranging from six to 60 months. The sample's standard deviation and coefficient of variation¹⁷ are 8.45 and 38.6 percent respectively. It is clear, however, that this information is far too aggregative and that it hides significant differences in average contract duration.

The obvious lines to draw for a cross-sectional analysis are between private and public sector contracts and between agreements with and without COLA clauses. These distinctions reflect a minimum amount of disaggregation, and the data are partitioned further in order to provide more information. It should be pointed out that the existence of a COLA clause does not necessarily imply heavy indexation of the base wage rate with respect to the Consumer Price Index. Indeed, a study by Marcil (1975) of the COLA contracts in the Canadian manufacturing sector estimated that the elasticity of the base rate with respect to the CPI was only 0.4 in 1974, the year in which the incidence of COLA clauses was at its peak. In this study we shall use the terms "contracts with COLA clauses" and "indexed contracts" interchangeably, and these terms should not be construed to imply any difference in the degree of wage indexation.

Table 8 shows summary statistics on contract length for the four sub-sectors. Three points about this information are noteworthy. To begin with, there is considerable variation in contract duration in all these categories. In the case of agreements with no COLA clauses, contracts as short as six months appear in both the private and public sectors.¹⁸ At the other end of the duration spectrum, very long contracts can be identified.

¹⁶Contract duration was defined as the expiry date minus the effective date.

¹⁷The coefficient of variation is a unit-free measure of dispersion and is defined as the ratio of the standard deviation of a series to the series' mean value.

¹⁸Six-month contracts were signed by a number of hospitals (e.g., the Ottawa General Hospital, the Royal Victoria in Barrie and the General and Marine Hospital in Owen Sound), by the Hamilton Board of Education and by the Community Security Establishment. In the private sector, six-month contracts were signed by York Farms of Brantford and by Dominion Stores in Montreal.

While the longest contract (60 months) appears in the private sector,¹⁹ a number of agreements for four years or more were signed in all four sub-sectors. Row three, in Table 8, shows the standard deviation of contract length by sub-sector. However, since this is sensitive to the units of measurement, the coefficient of variation is also reported. Row four, Table 8, which considers the standard deviation relative to the mean of a series, indicates that contract length is most variable in indexed, public sector, settlements (42.1 percent), with public sector unindexed settlements following as a close second (37.9 percent). More generally, public sector contracts have a more dispersed duration than private sector contracts.

TABLE 8
THE VARIATION OF CONTRACT DURATION (IN MONTHS)
(1966Q4-1981Q3)

	Private Sector Contracts			Public Sector Contracts			All contracts		
	NO COLA	COLA	TOTAL	NO COLA	COLA	TOTAL	NO COLA	COLA	Total
Contracts	3,756	1,177	4,933	2,906	289	3,195	6,662	1,466	8,128
Mean Duration	23.66	27.09	24.48	17.17	25.4	17.93	20.83	26.79	21.90
Standard Deviation	7.85	8.24	8.08	6.51	10.7	7.40	7.98	8.81	8.45
Coefficient of Variation	33.2%	30.4%	33.0%	37.9%	42.1%	41.3%	38.3%	32.9%	38.6%
Min. Value	6	8	6	6	12	6	6	8	6
Max. Value	60	51	60	48	54	54	60	54	60

The variability of contract duration by sector is explored in greater detail in Table 9, which gives the frequency distribution by year for each of the four classes. As can be seen, the large variance of contract duration in the case of indexed public sector contracts is due to the unusually large proportion of contracts which are longer than three years to maturity. In the other three sub-sectors, contracts tend to be distributed in the one to three year range, with two years as the mode in the private sector and one year as the most frequent choice in the public, no-COLA, sector.

¹⁹Five-year contracts were signed by Kaiser Resources in British Columbia, by Harding Carpets in Collingwood and by Canadian Industries in Brossbury, Quebec.

TABLE 9

FREQUENCY DISTRIBUTION OF CONTRACT LENGTH (L IN MONTHS)
(1966Q4-1981Q3)

	$L \leq 12$	$12 < L \leq 24$	$24 < L \leq 36$	$36 < L \leq 48$	$48 < L \leq 60$	Total
<u>Private Sector</u>						
No COLA	769	2,060	876	48	3	3,756
COLA	141	538	475	22	1	1,177
<u>Public Sector</u>						
No COLA	1,628	1,106	162	10	0	2,906
COLA	69	142	27	46	5	289
<u>Total</u>	2,607	3,846	1,540	126	9	8,128

The second point that emerges from the data in Table 8 is the general tendency for public sector agreements to be of shorter duration than those in the private sector. This difference is statistically significant.²⁰ In order to explore this theme further, the data in the four sub-sectors were disaggregated into the finer categories shown in Table 10. As can be seen, private sector contracts without COLA clauses are of uniformly longer duration than public sector ones. However, the picture for indexed contracts is less clear. Though public sector contracts are, in general, of a shorter duration, this is not always the case. For instance, provincial contracts have an average duration of 31.1 months, greater than that in any of the four private sector categories. The reason for this appears to be the behaviour of COLA contracts signed in the province of Quebec. Looking at the mean contract duration of indexed contracts by geographical data reveals some interesting disparities. Mean duration for the Maritimes, Quebec and Prairies-British Columbia was 19.5 months, 42.6 months and 23 months respectively. No COLA contracts were signed in the province of Ontario. The corresponding mean durations for contracts with no COLA clauses are much more homogenous -- Maritimes at 21.7 months, Quebec at 16.4 months, Ontario at 15 months and Prairies-British Columbia at 18 months.

Another regularity shown in the data of Table 8 is the propensity for indexed contracts to be of a longer duration than those containing no indexation provisions. In the private sector, mean contract duration is 27.09 months for COLA contracts and 23.66 months for contracts containing no

²⁰On the assumption that the data set constitutes a sample, rather than the population itself (in which case inferences can be made from Table 8), the null hypotheses tested were that mean duration for private unindexed contracts equaled that for public contracts and similarly for indexed contracts. The alternative hypotheses were that private sector durations exceeded those in the public sector. The null hypotheses were rejected.

COLA clauses. In the public sector, these figures are 25.4 months and 17.17 months respectively.²¹ This generalization holds up, with only one exception, at the disaggregated level too. As shown in Table 10, COLA contracts are of longer duration than unindexed ones except in Logging and Forestry. This point, that indexation provisions go hand in hand with longer contract lengths, was noted as long ago as the early 1960s.²² It was not, however, until the work of Gray (1978) that this subject attracted theoretical attention.²³

TABLE 10
THE CROSS-SECTIONAL VARIATION OF CONTRACT DURATION (IN MONTHS)

	Contracts	Mean Duration	Standard Deviation	Coeffi- cient of Variation	Mini- mum Value	Maxi- mum Value
PRIVATE SECTOR						
(i) <u>No COLA</u>						
Logging, Forestry	127	25.89	5.33	20.6%	12	36
Mining	158	25.78	9.47	36.7%	8	60
Manufacturing	2,192	24.36	7.78	31.9%	6	60
All Other	1,279	21.97	7.68	35.0%	6	48
(ii) <u>COLA</u>						
Logging, Forestry	26	23.73	0.96	4.1%	20	24
Mining	87	28.02	8.01	28.6%	11	39
Manufacturing	812	28.16	7.73	27.5%	10	48
All Other	252	23.65	9.24	39.1%	8	51
PUBLIC SECTOR						
(i) <u>No COLA</u>						
Health	1,116	14.89	5.40	36.3%	6	36
Education	579	20.10	6.16	30.7%	6	48
Federal	367	19.40	7.73	39.9%	6	38
Provincial	258	18.18	6.82	37.5%	9	36
Municipal	586	16.82	6.13	36.4%	9	36
(ii) <u>COLA</u>						
Health	120	25.38	11.25	44.3%	12	48
Education	45	30.80	11.83	38.4%	12	48
Federal	2	19.50	10.61	54.3%	12	27
Provincial	21	31.10	13.91	44.7%	12	54
Municipal	101	22.38	7.20	32.2%	12	36

²¹These differences are statistically significant at the 5% level.

²²See Garbarino (1962) and Macdonald (1967).

²³See section V, below.

To summarize, considerable variation exists in the duration of contracts signed between 1966Q4 and 1981Q3. Contract length varies from six months to 60 months and is longer in indexed contracts and in contracts written in the private sector. These cross-sectional differences, which are statistically significant, necessitate a separate examination of duration behaviour in the four sub-sectors. For this reason, the time-series discussion of section IV as well as the regression analysis in section VI are conducted at the disaggregated level. Analysis on pooled data would be quite inappropriate given the significant differences in average duration across the four sub-sectors.

In the next section, attention is focussed on the time-series aspects of contract duration.

SECTION FOUR

THE TEMPORAL BEHAVIOUR OF CONTRACT DURATION

The objective of this section is to analyze the temporal behaviour of the sample of contracts at our disposal. Two general ways of proceeding are of interest. (i) The agreements reached during any period (quarter, or year) may be considered as a unit and the average (quarterly, or annual) contract duration over the sample period may be examined. This procedure is followed in Tables 11 to 14, and Figures 1 to 4 below. (ii) An alternative procedure is to focus on contract chronologies, i.e., follow the history of a particular settlement through time. This approach is obviously too time consuming given the large number of bargaining units involved.²⁴ However, because of the potential insights to be derived from this method of analysis, a select group of chronologies is compiled. They are presented in the Appendix Tables A1 and A2.

Table 11 is a more detailed version of Table 8. These descriptive statistics are initially presented for three periods, the pre-AIB period, the AIB era and the post-AIB years to 1981Q3. An obvious question of interest is whether the program of wage and price controls, followed during 1975Q4 to 1978Q3, had an impact on contract duration. It may be argued that signing a contract during a period of controls involves accepting a set of conditions (e.g., a wage settlement) which would not have been chosen in the absence of controls.²⁵ If controls are to be removed at an uncertain future date, agents will be less likely to sign long contracts.²⁶ Indeed, this appears to have happened. Table 11 shows a decline in average contract length in all four sub-sectors during the AIB period. In the case of contracts with no COLA clauses, this decline is approximately equal to seven months in the private sector and five months in the public sector. Indexed contracts responded in a more varied way, with private sector duration declining by just under five months and public sector duration decreasing by over a year.²⁷ As Table 11 indicates, this decline is not reflected in the minimum values of AIB-period contract length; these are probably determined by technical factors particular to a handful of negotiating situations. There is, however, a marked decline in the maximum values of contract length. There are no five-year contracts in the AIB period, and four-year contracts appear only in the case of indexed private sector agreements.

With the removal of controls, this decline in duration is reversed and mean contract length tends to revert to its pre-AIB values in all four

²⁴The sample contains approximately 8,000 contracts, signed over a 14-year period. Given an average contract length of some two years, over 1,100 bargaining units are involved.

²⁵On this, there is very convincing evidence. See Christofides and Wilton (1979).

²⁶The Construction Industry Stabilization Council in the U.S. is thought to have decreased contract length.

²⁷These differences are statistically significant.

TABLE 11

CONTRACT DURATION DURING THREE SUB-PERIODS

	PRIVATE SECTOR		PUBLIC SECTOR	
	No COLA	COLA	No COLA	COLA
<u>Pre-AIB period</u>				
Contracts	2,081	438	1,133	65
Mean Duration	25.82	27.10	18.97	27.08
Standard Deviation	7.44	7.48	6.86	10.42
Coefficient of Variation	28.8%	27.6%	36.2%	38.5%
Minimum Value	7	8	6	12
Maximum Value	60	51	48	52
<u>AIB period</u>				
Contracts	782	236	849	59
Mean Duration	18.58	22.32	14.17	14.49
Standard Duration	7.56	8.91	5.03	4.86
Coefficient of Variation	40.7%	39.93%	35.5%	33.5%
Minimum Value	9	12	7	12
Maximum Value	40	48	39	24
<u>Post-AIB period</u>				
Contracts	893	503	924	165
Mean Duration	23.06	29.31	17.72	28.90
Standard Deviation	6.83	7.58	6.31	9.83
Coefficient of Variation	29.6%	25.9%	35.6%	34.0%
Minimum Value	6	10	6	12
Maximum Value	60	48	36	54

sub-sectors.²⁸ Minimum values are again all but unchanged, but maximum values register a marked increase in the case of private sector unindexed and public sector indexed contracts.

The behaviour of contract length through time is seen in greater detail in Tables 12 to 14 and Figures 1 to 4. Table 12 presents quarterly (simple) average contract duration for the two classifications, while Tables 13 and 14 show the number of employees covered by contracts signed in each quarter as well as the quarterly simple (\bar{L}^{SA}) and employee-weighted (\bar{L}^{WA}) average contract length by sub-sector. Figures 1 to 4 show the annual simple and employee-weighted average contract length for the private and public sectors respectively. As can be seen from these figures, the employee-weighted graphs tend to be somewhat more angular because they give more weight to particular contracts - those with a large number of employees. The graphs illustrate the decline in contract length that occurred during the AIB period, as well as its subsequent increase.²⁹

An alternative way of looking at the sample of wage contracts under consideration is to construct contract chronologies. That is, the sample is sorted by file number and all contracts bearing the same file number are printed sequentially. For each contract, a number of items of interest may then be examined. Since this study is primarily concerned with contract duration, that variable is listed (in months), along with the number of employees involved, whether COLA provisions were included (YES indicates indexed contracts), the stage at which the contract was settled³⁰ and the duration of negotiations (in months).

When the sample is organized in this way, a number of questions can be addressed: Do bargaining situations always involve the same contract duration? If not, do we observe a rotation behaviour (short contracts being followed by long and the converse)? What proportion of contract sequences always involves the same contract duration? Do we observe any sensitivity, in the bargaining situation, to economic conditions?

As indicated in section three, the sample consists of 4,933 private sector contracts and 3,195 public sector contracts. When these are

²⁸However, in most instances this reversal is not complete. Only the public sector COLA contracts have a duration not significantly different from pre-AIB values.

²⁹These figures also illustrate the fact, noted in the previous section, that indexed contracts are of greater duration than contracts containing no indexation provisions.

³⁰In the chronologies that follow in Appendix Tables A1 and A2, the following codes are used: 1 = Direct bargaining; 2 = Conciliation officer; 3 = Conciliation board; 4 = Post conciliation bargaining; 5 = Mediation; 6 = Mediation commission; 7 = Post-mediation bargaining; 8 = Mediation after work stoppage; 9 = Arbitration; 10 = Post-arbitration bargaining; 11 = Work stoppage; 12 = Bargaining after work stoppage and 13 = Other.

TABLE 12
AVERAGE CONTRACT DURATION (IN MONTHS)

	ALL CONTRACTS	PRIVATE	PUBLIC	NO COLA	COLA
1966Q4*	35.0	42.0	21.0	35.0	
1967Q1	23.7	24.7	22.0	23.7	
	25.3	27.4	18.5	25.3	
	27.3	28.5	17.8	27.3	
	24.3	24.6	21.0	24.3	
1968Q1	25.7	27.8	18.8	25.7	
	25.7	26.9	18.3	25.7	
	26.5	27.4	17.9	26.5	
	26.2	26.5	24.2	26.2	
1969Q1	25.6	27.1	17.3	25.6	
	23.7	27.8	17.0	23.7	
	25.6	28.0	20.3	25.6	
	25.1	27.6	19.7	25.1	
1970Q1	26.1	27.3	23.0	26.1	
	26.5	27.6	23.4	26.5	
	26.9	28.2	21.2	26.8	37.0
	26.5	28.0	21.3	26.0	37.0
1971Q1	28.4	28.6	27.8	28.0	37.0
	27.0	29.5	21.5	26.0	38.9
	26.9	27.8	24.1	26.3	35.4
	24.0	26.5	21.6	23.0	32.3
1972Q1	24.4	25.2	20.5	23.4	31.2
	24.6	26.3	21.5	24.0	30.3
	27.1	27.9	23.5	25.6	34.8
	26.2	27.0	25.0	24.0	43.1
1973Q1	23.2	27.4	17.6	22.4	32.8
	25.9	27.7	21.3	25.1	33.8
	25.9	27.1	22.4	25.6	27.6
	23.9	26.3	19.3	23.4	26.4
1974Q1	21.8	24.9	16.8	21.4	25.2
	22.9	24.9	20.3	21.9	26.8
	21.5	22.4	19.8	20.9	22.7
	19.7	21.5	16.2	17.5	22.9
1975Q1	17.3	20.5	14.3	15.6	23.1
	20.1	22.2	17.1	18.0	23.7
	19.2	22.6	15.4	17.1	26.2
	18.1	21.3	13.9	17.5	28.8

TABLE 12 (continued)

	ALL CONTRACTS	PRIVATE	PUBLIC	NO COLA	COLA
1976Q1	20.9	24.0	13.6	17.4	29.5
	18.0	20.6	14.1	18.0	17.6
	18.7	20.4	17.1	18.5	19.9
	18.3	22.4	13.9	17.6	21.5
1977Q1	15.3	17.6	13.1	14.8	19.3
	17.1	17.4	13.0	14.9	16.3
	21.9	16.3	13.3	14.7	17.4
	20.1	17.7	15.3	15.0	22.4
1978Q1	15.5	17.3	13.1	14.8	19.3
	17.1	19.6	13.8	16.9	17.7
	21.9	24.2	16.1	20.7	26.7
	20.1	22.9	15.9	18.9	24.2
1979Q1	23.7	19.3	19.3	21.7	28.7
	22.6	18.2	18.2	20.3	29.8
	22.3	19.8	19.8	20.2	27.2
	23.5	20.6	20.6	20.8	31.3
1980Q1	24.0	22.1	22.1	19.1	35.0
	24.7	22.2	22.2	21.3	32.2
	22.8	19.9	19.9	21.2	29.2
	22.7	18.7	18.7	19.9	30.0
1981Q1	21.7	16.4	16.4	19.4	30.5
	22.0	19.9	19.5	20.1	27.4
	24.4	18.7	20.3	20.7	28.4

*There are very few contracts in 1966Q4.

TABLE 13

PRIVATE SECTOR: CONTRACTS AND AVERAGE CONTRACT
LENGTH, BY QUARTER (IN MONTHS)

	CONTRACTS WITHOUT COLA CLAUSES				CONTRACTS WITH COLA CLAUSES			
	Contracts	Employees	L WA	L SA	Contracts	Employees	L WA	L SA
1966Q4	2	2,300	45.39	42.00				
1967Q1	22	89,065	30.42	24.68				
	40	45,490	28.67	27.40				
	31	68,125	31.21	28.55				
	32	81,665	23.74	24.59				
1968Q1	32	77,570	28.87	27.81				
	59	68,710	28.07	26.93				
	87	177,110	24.90	27.44				
	44	124,610	22.60	26.52				
1969Q1	48	91,320	25.58	27.15				
	60	72,605	28.18	27.82				
	46	72,095	28.14	28.00				
	37	108,770	27.85	27.62				
1970Q1	31	46,915	25.62	27.26				
	72	94,010	28.78	27.58				
	59	109,880	26.99	28.07	1	1,650	37.00	37.00
	54	114,675	24.88	27.52	3	4,660	38.41	37.00
1971Q1	48	90,685	30.21	28.08	3	3,980	37.04	37.00
	71	146,185	25.85	28.35	9	7,955	38.47	38.89
	52	41,590	26.65	27.12	5	3,275	35.46	35.40
	32	48,350	19.96	24.88	9	16,095	34.32	32.33
1972Q1	64	64,190	24.01	24.88	12	13,325	26.12	31.17
	81	44,855	25.67	25.53	12	9,600	33.18	31.83
	103	120,225	25.85	26.22	25	56,370	34.81	34.80
	82	66,100	22.12	26.35	7	8,255	32.22	34.85
1973Q1	79	49,140	29.39	26.54	11	8,470	35.06	33.64
	108	67,000	26.12	26.81	16	28,175	35.33	33.75
	75	62,360	26.10	26.77	21	28,485	31.27	28.33
	90	87,115	23.42	26.22	26	34,070	30.85	26.54
1974Q1	94	153,045	24.15	24.71	13	9,395	27.16	26.54
	85	46,130	24.20	24.08	36	21,865	27.29	26.94
	58	33,570	22.37	22.26	50	96,340	18.74	22.50
	46	47,910	15.62	19.37	69	133,620	16.26	22.90

TABLE 13 (Continued)

	CONTRACTS WITHOUT COLA CLAUSES				CONTRACTS WITH COLA CLAUSES			
	Contracts	Employees	\bar{L} WA	\bar{L} SA	Contracts	Employees	\bar{L} WA	\bar{L} SA
1975Q1	49	28,730	17.51	18.57	32	16,120	24.47	23.34
	58	59,735	21.28	21.02	47	36,295	23.43	23.55
	50	32,180	18.72	19.56	31	30,490	30.11	27.58
	47	40,110	19.59	20.49	5	3,250	29.54	28.80
1976Q1	74	60,717	19.98	19.99	48	38,155	26.59	30.31
	102	69,357	19.05	21.02	18	14,760	17.37	18.44
	82	56,270	20.66	20.04	28	31,450	20.43	21.64
	61	55,281	21.93	22.36	24	21,325	20.00	22.50
1977Q1	78	59,040	17.32	16.17	18	10,555	21.53	21.33
	91	68,030	16.41	17.02	25	27,680	15.92	18.60
	85	64,670	14.11	15.98	16	9,235	17.38	18.13
	58	56,685	14.63	15.71	23	15,695	20.71	22.78
1978Q1	54	58,780	18.85	16.26	14	8,850	21.80	21.43
	89	98,885	17.40	19.94	38	121,815	13.43	18.79
	112	115,390	24.01	23.01	45	51,515	30.49	27.00
	84	100,720	20.31	21.56	35	50,330	21.14	26.00
1979Q1	76	50,119	22.95	23.75	45	26,770	30.55	28.82
	101	96,540	19.25	22.39	60	144,300	33.23	30.58
	71	88,505	23.38	22.48	42	78,345	31.44	28.50
	51	66,235	20.89	23.29	33	90,780	35.93	30.48
1980Q1	55	34,805	23.78	24.44	30	50,760	25.98	31.27
	67	51,810	23.80	24.04	52	75,950	24.57	31.44
	81	97,845	22.95	23.41	25	32,245	31.87	30.48
	58	69,429	20.99	22.62	35	43,175	32.91	30.49
1981Q1	37	50,100	26.02	24.62	21	44,785	23.85	31.76
	44	42,315	22.94	24.23	27	44,250	29.16	30.74
	17	29,600	21.44	22.00	32	109,480	26.19	28.13

\bar{L} WA: Duration, weighted average

\bar{L} SA: Duration, simple average

TABLE 14

PUBLIC SECTOR: CONTRACTS AND AVERAGE CONTRACT
LENGTH, BY QUARTER (IN MONTHS)

	CONTRACTS WITHOUT COLA CLAUSES				CONTRACTS WITH COLA CLAUSES			
	Contracts	Employees	\bar{L} WA	\bar{L} SA	Contracts	Employees	\bar{L} WA	\bar{L} SA
1966Q4	1	1,650	21.00	21.00				
1967Q1	12	22,630	20.26	22.00				
	12	11,940	18.93	18.50				
	4	6,930	18.46	17.75				
	3	4,120	15.65	21.00				
1968Q1	10	22,310	22.03	18.80				
	10	10,880	19.21	18.30				
	9	14,450	20.03	17.89				
	6	8,980	23.17	24.17				
1969Q1	9	10,180	15.87	17.33				
	37	87,780	15.60	16.97				
	21	11,445	20.41	20.29				
	17	76,860	30.16	19.71				
1970Q1	11	39,115	23.85	23.00				
	24	50,549	22.93	23.38				
	13	16,270	27.62	21.23				
	17	35,355	26.73	21.29				
1971Q1	17	32,795	31.02	27.82				
	37	91,670	23.53	21.49				
	20	57,810	29.00	24.15				
	42	71,530	24.31	21.62				
1972Q1	14	24,065	21.03	20.50				
	53	91,030	22.93	21.64	1	725	12.00	12.00
	27	33,355	23.65	23.11	1	2,500	35.00	35.00
	44	63,985	24.53	19.55	10	182,000	48.53	48.80
1973Q1	68	69,870	21.23	17.50	1	395	24.00	24.00
	49	68,835	20.10	21.33	0	0	-	-
	31	22,925	23.41	22.77	1	3,885	12.00	12.00
	60	76,819	21.03	19.18	1	225	24.00	24.00
1974Q1	63	112,715	23.23	16.43	5	26,915	23.86	21.60
	84	94,055	20.07	19.61	10	20,725	24.34	26.40
	54	71,145	20.88	19.46	4	2,550	24.71	24.75
	55	77,935	15.94	15.87	3	4,160	21.69	22.00

TABLE 14 (Continued)

	CONTRACTS WITHOUT COLA CLAUSES				CONTRACTS WITH COLA CLAUSES			
	Contracts	Employees	\bar{L} WA	\bar{L} SA	Contracts	Employees	\bar{L} WA	\bar{L} SA
1975Q1	80	74,615	17.63	13.85	5	1,655	22.01	21.60
	52	80,800	15.26	14.73	18	9,390	24.00	24.00
	67	75,445	14.18	15.28	5	3,835	14.30	17.60
	40	50,752	14.31	13.93	0	0	-	-
1976Q1	49	87,070	12.39	13.43	3	1,955	13.23	16.00
	75	114,415	13.68	13.97	7	29,745	12.47	15.43
	120	104,420	15.09	17.39	6	6,010	12.00	12.00
	76	137,494	12.90	13.82	4	14,530	19.08	15.75
1977Q1	93	137,648	12.71	13.15	5	3,570	12.00	12.00
	107	175,825	13.02	13.11	13	10,405	12.00	12.00
	77	105,070	12.50	13.31	2	9,455	12.00	12.00
	76	85,400	14.00	14.48	10	29,710	23.67	21.60
1978Q1	48	72,473	12.56	13.23	2	1,315	12.00	12.00
	86	147,264	15.55	13.80	11	8,875	13.08	13.09
	58	177,583	18.50	16.16	1	575	12.00	12.00
	68	102,115	16.97	15.72	9	6,860	18.03	17.33
1979Q1	48	50,900	17.21	18.40	5	10,635	25.17	28.00
	101	204,921	17.10	18.17	4	3,975	15.35	18.00
	81	114,865	21.04	18.19	24	10,995	25.63	25.00
	69	75,595	19.22	19.03	8	43,665	51.90	34.50
1980Q1	93	109,885	15.09	15.94	36	192,040	41.21	38.17
	95	161,540	18.54	19.37	23	58,925	32.03	33.78
	73	95,960	19.09	18.70	13	16,830	25.82	26.77
	59	127,990	20.73	17.24	9	16,800	33.00	28.22
1981Q1	57	78,185	15.96	16.05	3	5,580	26.90	22.00
	107	210,865	18.29	18.43	25	23,105	24.80	23.84
	18	40,735	22.60	19.39	1	850	37.00	37.00

\bar{L} WA: Duration, weighted average

\bar{L} SA: Duration, simple average

FIGURE 1

SIMPLE ANNUAL AVERAGE CONTRACT LENGTH: PRIVATE SECTOR

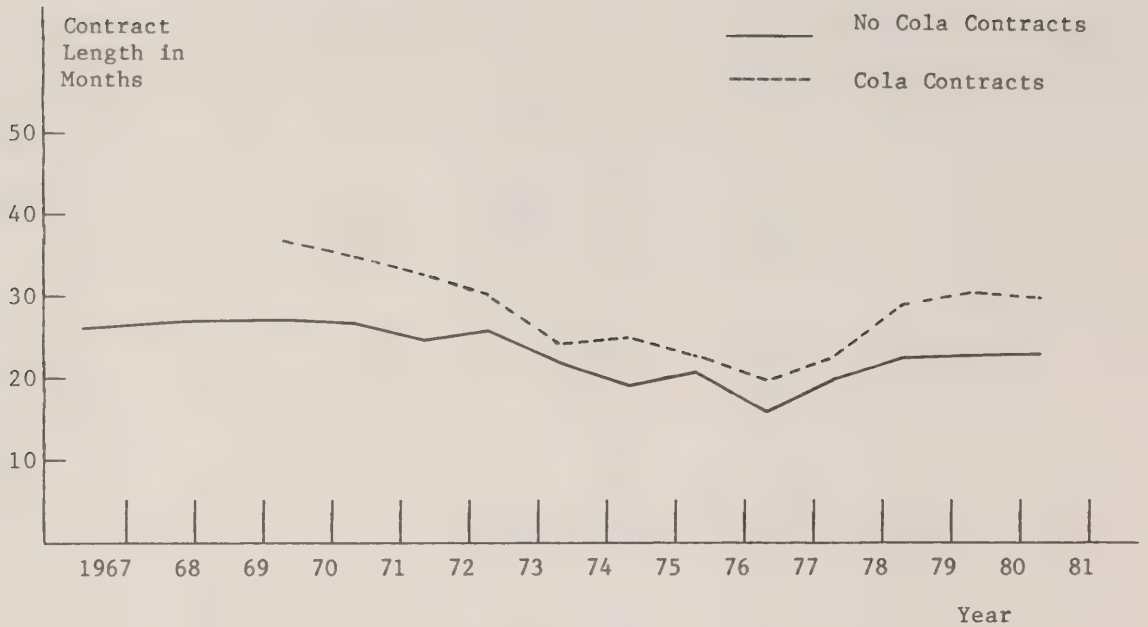


FIGURE 2

EMPLOYEE-WEIGHTED ANNUAL AVERAGE CONTRACT LENGTH: PRIVATE SECTOR

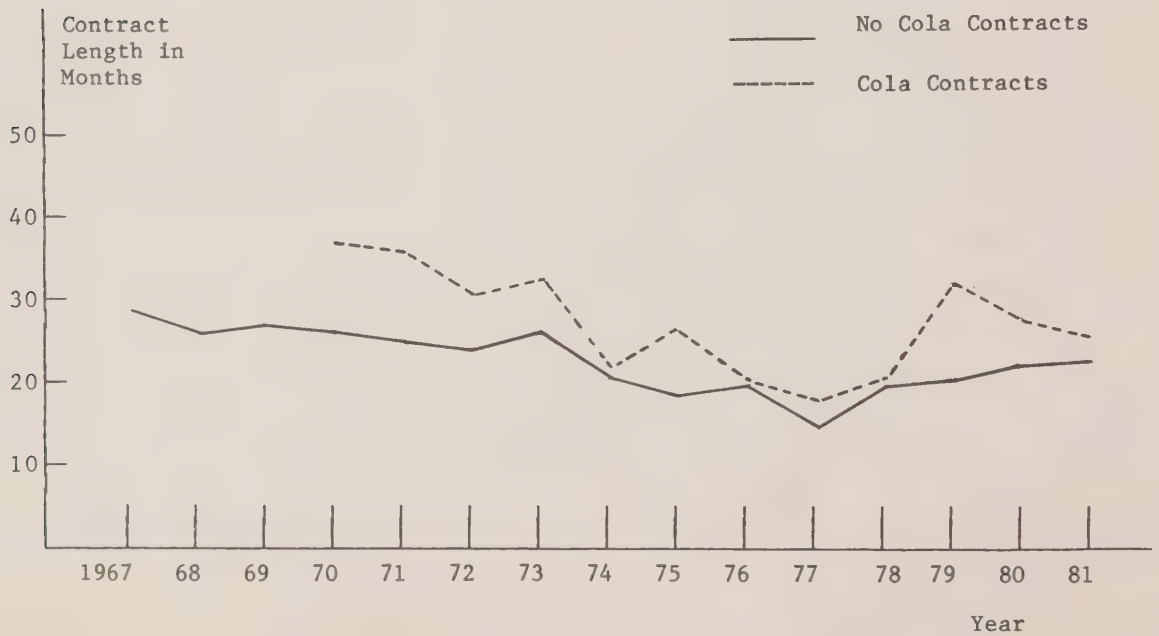


FIGURE 3

SIMPLE ANNUAL AVERAGE CONTRACT LENGTH: PUBLIC SECTOR

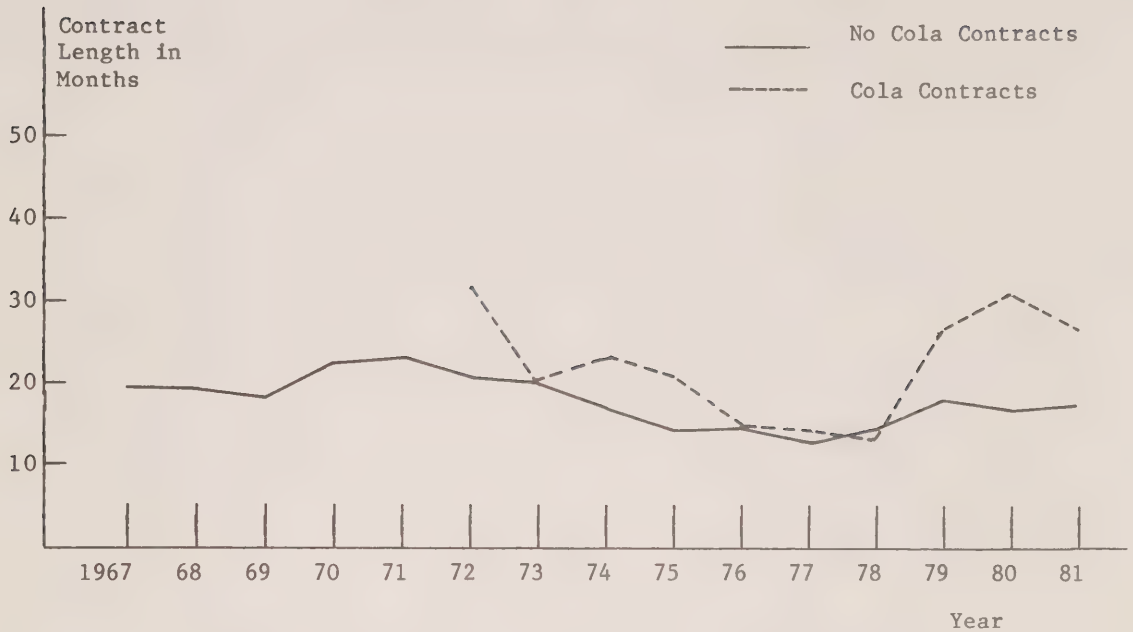
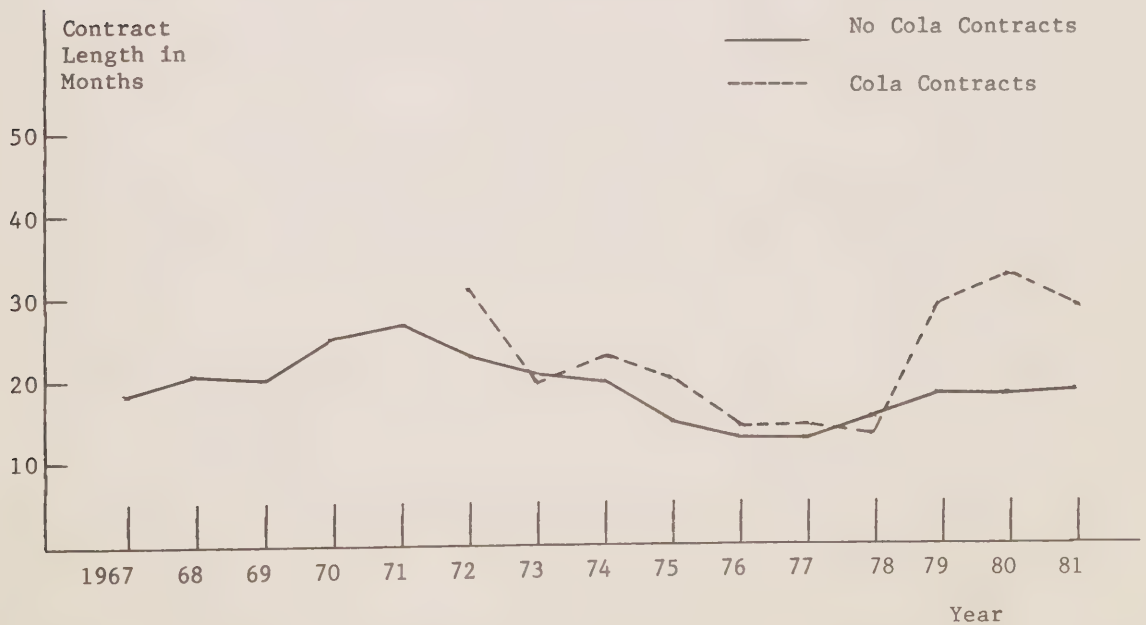


FIGURE 4

EMPLOYEE-WEIGHTED ANNUAL AVERAGE CONTRACT LENGTH: PUBLIC SECTOR



sorted by file number, there are 1,118 private sector and 636 public sector sequences of two or more contracts. Since the number of implied chronologies is very large, only an illustrative set of them is included in this study. This set consists of the largest, most continuous bargaining situations, within certain industries as defined in Statistics Canada's Standard Industrial Classification (SIC). The chosen ones involve contracts covering long historical periods. These private and public sector chronologies are presented in the Appendix Tables A1 and A2. The tables also indicate the relevant SIC classifications, the company's file number, and the relative size of the chosen chronology.³¹

The two tables display a wide variety of behaviour. Two companies signed contracts of the same duration for over 12 years. File #03100500101 signed seven two-year contracts, while File #54409000203 signed 14 one-year contracts. In all other cases contract duration varied, sometimes substantially; e.g., File #29509400101 which signed contracts ranging from one to three years. There is little evidence in this, admittedly small, number of chronologies of any regular alternating between short and long contracts. The nearest example of such behaviour is contained in Table A1(v): File #27109401103 alternated between two and three-year contracts until 1980, when it signed a two-year contract which followed the 1978 two-year contract. The fact that most companies do not adhere to a fixed duration rule may suggest that contract length does respond to changes in economic conditions. There is fairly strong evidence, for instance, that contract duration declined during the AIB period: File #37800501001, which never before signed one-year contracts, signed three consecutive such contracts between 1976 and 1978. This is also true of Files 93100700101, 63100990101 and 50109000105. However, these statements do not amount to formal hypothesis tests, and exceptions can be found; e.g., File #29509400101. A second question is whether the decline of contract duration is due to the advent of controls or increased inflation uncertainty. These two influences are disentangled in section six.

It will be recalled that the data of Table 8, section three, indicated that indexed contracts are of longer duration than unindexed ones. The chronologies chosen happen not to reflect this fact. When COLA clauses appear for the first time, they are accompanied by no evident increase in their duration.³²

The contracts contained in these chronologies were signed in a wide variety of settlement stages and indicate no direct relationship between stage of settlement and duration. For instance, File #82100905391, which almost always signed two-year contracts, reached these settlements in stages ranging from Conciliation Officer (2) to Arbitration (9). By contrast, File #54409000203's one-year contracts were always arrived at

³¹The notation Li, in the tables, indicates that the particular situation had the ith largest number of employees in its last contract.

³²See, for instance, File #03100500101 and 06100200201. The reader is reminded, however, that the presence of a COLA clause need not imply heavy indexation. This may be particularly true in the case of the first COLA contract signed by two parties.

through direct bargaining. These wage chronologies suggest that very useful work, beyond the scope of this study, can be done by looking at the strike record of particular firms. The contrast between #29509400101's rather poor industrial relations record (three consecutive contracts involving a strike) and #54409000203's spotless record is very striking. It would be interesting to know what proportion of Canada's person-days lost in strikes is attributable to a particular set of bargaining situations.

The duration of negotiations range from one month to the staggering 15 months it took to negotiate the two-year contract signed by File #82100905391 in 1976. In general, the duration of negotiations appears unduly long.

Table 15 considers these chronologies from a different perspective. It addresses the question, What proportion of these contract sequences displays no variation in duration? The chronologies were used to construct the standard deviation of contract duration. The proportion of these with a standard deviation equal to zero was then calculated. Table 15 reports this proportion by NC, where NC is the number of contracts in a sequence. Of the 1,118 sequences in the private sector that had $NC \geq 2$, 21.7 percent had no variation in contract duration. Clearly, the greater the number of contracts in any one chronology, the smaller this proportion is likely to be. Hence the decline from 42.7 percent for $NC = 2$, to 10.7 per cent for $NC \geq 4$. A similar pattern exists in the public sector.

TABLE 15
THE PROPORTION OF CHRONOLOGIES WITH A ZERO STANDARD
DEVIATION OF DURATION
(1961Q4 - 1981Q3)

	$NC \geq 2$		$NC = 2$		$NC = 3$		$NC \geq 4$	
	Contracts	%	Contracts	%	Contracts	%	Contracts	%
Private	1,118	21.7	274	42.7	254	24.8	590	10.7
Public	636	23.0	116	32.8	132	23.5	388	19.9
Total	1,754	22.2	390	39.7	386	24.4	978	14.3

NC \equiv Number of contracts in sequence.

Table 16 indicates the proportion of chronologies with a zero standard deviation in duration by SIC category. Logging and Forestry contracts in the private sector and Health contracts in the public sector are most likely to be of unchanging duration. At the other extreme, only 1.8 percent of federal contracts are in that category.

TABLE 16

THE PROPORTION OF CHRONOLOGIES WITH A ZERO STANDARD
DEVIATION OF DURATION BY SIC GROUP (NC \geq 2)
(1961Q4 - 1981Q3)

SIC	PRIVATE SECTOR		SIC	PUBLIC SECTOR	
	Contracts	%		Contracts	%
Logging and Forestry	36	36.1	Health	251	35.9
Mining	60	18.3	Education	143	13.3
Manufacturing	709	24.4	Federal	57	1.8
Other	313	14.7	Provincial	67	23.9
			Municipal	118	17.0
Total	1,118	21.7	Total	636	23.0

NC \equiv Number of contracts in sequence.

In summary, this section has shown that only a small proportion of both private and public sector contract chronologies involve no change in contract duration. Most agents have found it desirable to adjust contract durations in response to economic conditions and circumstances. It was found, for instance, that contract duration declined after 1973 and that it began to increase again toward the end of the sample period. It will be one of the major tasks of section six to untangle the separate influence of inflation uncertainty and the Anti-Inflation Program on contract length.

These chronologies constitute an interesting new way of looking at a number of labour market characteristics. However, it is rather difficult to make statistical inferences on the basis of these contract histories. In order to analyze the determinants of contract duration rigorously, it is necessary to revert to the pooled sample, treating each contract as a separate observation. The contribution of a number of variables will be evaluated and a host of hypotheses will be tested using regression analysis. Before this latter material is discussed, a brief survey of the literature dealing with contract duration is presented in section five.

SECTION FIVE

A REVIEW OF THE THEORETICAL AND EMPIRICAL LITERATURE

Interest in the general question of contract duration dates at least as far back as the early 1960s. It will be recalled from section two, that a very significant event in the evolution of North American practices with regard to contract duration was the two year COLA agreement reached by GM and UAW in 1948. This agreement, which was followed by a five-year contract in 1950, attracted considerable attention and may have helped fashion the trend to longer contracts noted earlier.³³ Commenting on this trend, Garbarino (1962) attributed it to (i) "the desire to minimize uncertainty and instability in union management relationships", and (ii) "the settlement of conflicts of interest or their conversion into conflicts of rights".³⁴

The literature on this early period in the development of the long-term contract is reviewed by two Canadian studies carried out for the Task Force on Labour Relations³⁵ by Gorbet (1968) and Samlalsingh (1968).

A major concern of these studies is the relationship between contract duration and the degree of wage indexation. Both authors believe that decisions with respect to these issues are made jointly³⁶ and that the lengthening of contracts during the 1950s would not have occurred if COLA clauses had not become widely accepted.³⁷ If Gorbet and Samlalsingh discuss

³³See MacDonald (1967).

³⁴Garbarino (1962, pp. 75-76) "Conflicts of rights in Industrial Relations involve the interpretation and enforcement of standards written into the collective bargaining contract or accepted by both parties as customary practice. Conflicts of interest involve bringing new issues into the area of collective bargaining. Viewed over time, virtually all aspects of collective bargaining involve conflicts of interest at first. As the relationship develops, areas in which standards are established then become the arena for possible conflicts of rights."

³⁵See Report No. 44, 1968. This report, which appears to be in two parts is authored by F.W. Gorbet (dated January, 1968) and R.S. Samlalsingh (dated September, 1968), and is entitled The Duration of Collective Agreements.

³⁶Gorbet (1968, p. 6) and Samlalsingh (1968, p. 2). In this regard these studies anticipate the concerns expressed by Gray (1978) and Cousineau, Lacroix and Bilodeau (1980). Both studies contain a great deal of material regarding the incidence of COLA clauses.

³⁷In this regard the GM-UAW contract is of particular interest, and both studies discuss it at length. There is a tendency, however, to treat the existence of a COLA clause as synonymous with a high degree of indexation. Their arguments would not be convincing if that were not the case. Indeed, we know that COLA yields tend to be rather low.

the determinants of contract duration without regard to the question of indexation, it is because they feel that this procedure is analytically convenient.

With this justification, Gorbet and Samlalsingh turn their attention to the determinants of contract duration, their main concern. In addition to presenting a fair amount of information on contract duration,³⁸ these studies elaborate Garbarino's point (i) above.

Although Gorbet (1968) and Samlalsingh (1968) covered much useful ground, both studies stopped short of a serious statistical analysis of the determinants of contract length. The authors argue, rather convincingly, that the discrete jump in contract duration during the 1950s was primarily related to the "qualitatively different system of wage negotiations".³⁹ There is, however, very little discussion of the likely determinants of contract duration once the new institutions were established.⁴⁰

In the last few years, interest in the general question of the nature and length of contractual arrangements has been rekindled. Rather paradoxically, this appears to stem largely from developments in the theoretical literature on macro-economics in general and the efficacy of stabilization policies in particular.

The rational expectations literature has demonstrated that, under certain conditions, any attempt to stabilize the economy is doomed to failure. In assessing this important result, a number of individuals focussed on the institutional realities of the labour market. Fischer (1977), for instance, presented a model which involves overlapping wage contracts written for an arbitrary number of time periods. During any one period, a portion of economic agents is contractually bound to overlook relevant new information and, consequently, the monetary authority can affect output, despite the fact that agents form their expectations rationally. Since the proportion of agents who are locked into contracts during any particular period depends positively on the number of periods for which contracts are written, contract length emerges as a variable of paramount importance. An overlapping wage contract model was also considered by Taylor (1979).

³⁸This information was reviewed in section two.

³⁹Samlalsingh (1968, p. 1) is referring to the GM-UAW-style contracts.

⁴⁰Both authors conclude that longer contracts are more likely to be found in larger units. However, this feeling was not based on any statistical analysis. Samlalsingh (1968, p. 21) hinted at an additional factor when she wrote "The economic environment prevailing in the period under consideration has been a major factor in the general shift towards longer contracts". We return to both these points in section six.

Why these wage contracts exist at all is an issue which has only recently attracted any sustained attention.⁴¹ Also there has recently been renewed interest in the determinants of contract duration. Though contract duration has been known to vary across bargaining units, the implicit assumption hitherto made appears to be that this variance can be largely accounted for by differential negotiating costs. This assumption, that negotiating costs constitute the sole, or even prime, determinant of contract length, has been questioned. Fischer argued that if the monetary authority attempts to systematically exploit the opportunity inherent in his model to affect output, contract arrangements may change.⁴² However, he did not provide any arguments as to the likely determinants of these arrangements.

This particular task was addressed by Gray (1978). In the context of a macroeconomic model where the degree of wage indexation and contract length are determined recursively, Gray concluded that when the degree of wage indexation is optimal,⁴³ contract length depends inversely on the amount of uncertainty in the system,⁴⁴ and it varies with the cost of writing contracts. Thus, while negotiating costs continue to feature prominently in discussions of the determinants of contract length, the latter now include further arguments such as the uncertainty variables discussed by Gray.

A recent paper by Canzoneri (1980) combines elements of both the Fischer (1977) and Gray (1978) papers in that it demonstrates a stabilization role for monetary policy in the context of a model in which contract length is endogenous.⁴⁵ In this paper, labour unions, having set the

⁴¹In this regard the exchange between Barro (1977) and Fischer (1977) is particularly interesting, as is the critical assessment of the implicit contracts literature contained in Akerlof and Miyazaki (1980).

⁴²See Fischer (1977, p. 204).

⁴³The optimum degree of wage indexation, which is in general less than complete but greater than zero, was derived in Gray's earlier (1976) paper and continues to depend on the same variables, namely the elasticities of labour demand and supply and the relative size of the variance of monetary and real disturbances. When the optimal degree of wage indexation is built into a contract, contract length is independent of the degree of indexation and depends mainly on transactions costs and uncertainty.

⁴⁴This major conclusion is supplemented by a number of statements that follow from a disaggregated version of the model in which indexation is assumed to be costly. Gray shows (i) that indexing arrangements will then appear only in contracts which are sufficiently long, and (ii) that the proportion of indexed contracts will increase with monetary variability.

⁴⁵Or, rather, contract length is endogenous for one set of market participants, namely labour unions. These unions, mindful of real wage targets over a number of periods, offer firms nominal wage targets over a number of periods.

nominal wage rate,⁴⁶ seek the contract length that balances the savings from less frequent negotiations (namely smaller contracting costs) against the costs of so doing (namely greater price level prediction errors and hence greater deviations of the real wage rate from its target levels). As in the Gray (1978) paper, contracting costs tend to lengthen contracts, while uncertainty tends to reduce contract length. In this model, uncertainty⁴⁷ gives rise to the price level prediction errors which affect contract length.

Finally, a recent paper by Scarth (1982) is relevant to this study. Scarth's paper evaluates tax-based incomes policies, as well as other policies for reducing the rate of inflation, in the context of a model of overlapping labour contracts. Because of this staggering of contracts, wage rates respond relatively slowly to current policy initiatives. One of the conclusions reached by Scarth (1982, p. 124) is, therefore, that "the single most effective policy for lessening the transitional unemployment costs of disinflation policy ... is one of government incentives for shortening average contract length." Scarth (1982, p. 125) goes on to point out that this shortening will, if involuntary, be costly to the parties involved "More frequent wage settlements would thus impose costs on the agents affected This warrants immediate study".

Despite these theoretical studies, there has been no recent empirical examination of the determinants of contract duration. There appear to exist only two studies mentioning the issue at all, and even these pay only passing attention to contract duration. A discussion paper by Cousineau, Lacroix and Bilodeau (1980) is primarily directed toward the empirical verification of the Shavell (1976) risk sharing model of wage indexation.⁴⁸ Since contract length does not figure in the Shavell framework, it is unclear why the authors consider contract duration at all. Nevertheless, Cousineau, Lacroix and Bilodeau specify a model in which the decision to index (in binary form) and contract length are considered jointly and they include a brief⁴⁹ discussion on contract length in their paper. Passing reference to contract duration is also contained in Crowley (1981), who discusses the impact of controls on a number of collective bargaining issues.

⁴⁶In a risk-neutral fashion, unions select a nominal wage rate so that, given price expectations, the real wage rate will equal its target level.

⁴⁷In Canzoneri's specific examples, uncertainty arises in the form of random shocks which affect aggregate demand and the money supply.

⁴⁸In this regard data limitations imposed some rather severe constraints on their empirical model. For instance, while the Shavell (1976) and Blinder (1978) models deal with the optimal degree of wage indexation, Cousineau, Lacroix and Bilodeau (1980) examine the incidence of indexation. In addition, their empirical work proxies worker labour income rather than the sensitivity of non-wage income to inflation. Finally, they proxy the sensitivity of firm net income to inflation with the product of the inflation rate and a job vacancy rate.

⁴⁹See Cousineau, Lacroix and Bilodeau (1980, pp. 23-24).

SECTION SIX

THE DETERMINANTS OF CONTRACT DURATION

The main determinants of contract length proposed in the literature appear to be negotiating costs and the degree of uncertainty in the system. Greater negotiating costs make for longer contracts, while greater uncertainty reduces the optimum contract length.

Our analysis next requires empirically viable proxies for transaction costs and uncertainty. It may be argued that the transaction costs associated with negotiations between an employer and a particular group of employees can be captured by a set of dummy variables which assigns each micro observation in the sample to an SIC group at the three-digit level. In the case of the private sector, four such groups are distinguished: PRSIC1 identifies contracts in logging and forestry, PRSIC2 identifies mining and milling and PRSIC3 contracts in manufacturing. The remaining contracts (e.g., contracts in transportation, communications, power, trade and services) form the basis of comparison. In the public sector, four dummy variables are included in the regression equations: PUSIC1 identifies health service contracts, PUSIC2 education contracts, PUSIC3 federal government contracts and PUSIC4 provincial government contracts. The basis of comparison is municipal government contracts. In the case of public sector COLA contracts only PUSIC1 and PUSIC2 are included because of the very small number of contracts involved. The coefficients on these dummy variables cannot be signed a priori.

The level of uncertainty as perceived by a particular negotiating group, depends on certain characteristics specific to the bargaining parties as well as prevailing economic conditions at the time. To the extent that the former are reasonably constant between contracts, they are, at least partially, captured by the various dummy variables mentioned above. Uncertainty regarding general economic conditions is assumed to consist of uncertainty regarding future price inflation. There is, now, overwhelming evidence that anticipated future inflation figures prominently in wage negotiations and that base wage changes are significantly affected by this variable.⁵⁰ It seems reasonable to suppose, therefore, that if agents are uncertain about the future rate of inflation, they will attempt to minimize the length of time over which an agreement (which will very likely incorporate incorrect projections of inflation) will hold. This argument applies even to contracts which contain cost of living escalators, provided that the degree of indexation is not complete and the price of the firm's product does not rise at a rate identical to that of the Consumer Price Index. Thus, the coefficient on the variable proxying inflation uncertainty in equations determining contract length should have a negative sign.

⁵⁰In the context of the contract data analyzed by this paper, Riddell (1979) and Christofides, Swidinsky and Wilton (1980a, 1980b) all report that inflation expectations significantly affect wage settlements at the micro level. See also Canzoneri (1980) for a theoretical discussion of this point.

In order to obtain a proxy for inflation uncertainty, it is assumed that the rate of inflation can be adequately described by a distributed lag of past rates of inflation.

$$(1) \dot{P}_t = b_0 + b_1 \dot{P}_{t-1} + b_2 \dot{P}_{t-2} + \dots + b_N \dot{P}_{t-N} + V_t$$

This equation is re-estimated in each quarter of the sample as another value of \dot{P} is introduced into the sample,⁵¹ beginning with a sample of CPI inflation (at annual rates) that terminated in the quarter prior to the very first (1966Q4) contract. The Almon method of distributed-lag estimation is used with a lag length equal to eleven quarters, a polynomial of degree three and distributed lag weights which are not constrained to add up to unity.⁵² The square of the standard errors of estimate from these sliding regressions is then used as a proxy for the variance of anticipated inflation in the respective quarters. Since this variable is intended to capture fluctuations in the uncertainty regarding future inflation its value in any one quarter applies to all contracts signed during that period. This variable appears in Figure 5. As can be seen, inflation uncertainty is reasonably constant until 1973, it peaks during 1977 and declines thereafter.

Another variable included in the empirical work of this section is a dummy variable DAIB which takes the value of unity during the AIB period 1975Q4 to 1978Q3 and equals zero at all other times. As already seen in section three, there are strong indications that contract duration shrank during the period of controls. Accordingly, this variable should have a negative coefficient.

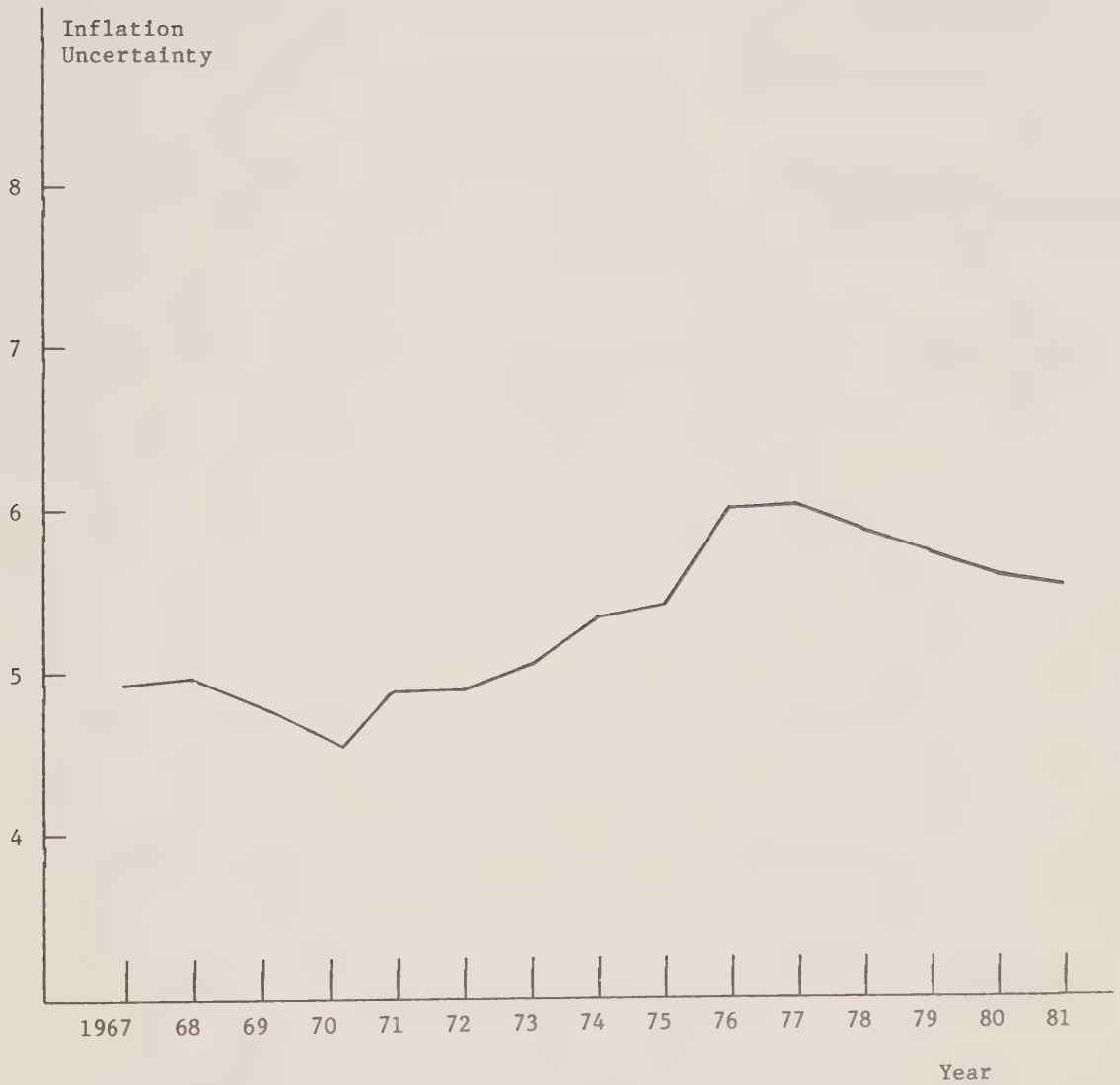
As noted in the review of the literature contained in chapter five, two further variables were considered by Gorbet (1968) and Samlalsingh (1968), namely the size of the negotiating unit and the wage settlement. It was thought likely that the employer may be prepared to "pay" for longer contracts⁵³ and that larger units may write longer contracts. In order to

⁵¹A similar procedure was used in earlier work in the context of a weak form of rational expectations to generate contract-length-specific projections of anticipated inflation. For more details, see Christofides, Swidinsky and Wilton (1980a, 1980b). The present specification improves on the earlier one by ensuring that agents are provided with no more information than was available at the time contract negotiations took place and by dispensing with the assumption of temporal stability in the basic equation (1).

⁵²When the distributed lag weights are so constrained, very similar results emerge. However, in light of Sargent's (1971) criticism of so constraining distributed lag weights and in order to economize on space, these results are not reported.

⁵³However, Gorbet and Samlalsingh were not able to come up with any hard evidence to back this conjecture. An additional variable, strike costs, does not have a clear effect on duration. See Jacoby and Mitchell (1983).

FIGURE 5
AVERAGE ANNUAL INFLATION UNCERTAINTY



examine these possibilities, the variables $\dot{W} \equiv$ the annual increase in the base wage rate over the life of the contract and $EMPS \equiv$ the number of employees covered by the contract are also considered.

In the empirical analysis that follows, desired contract length L^* (in months) at the individual, micro, level⁵⁴ is assumed to depend on a set of the industry dummy variables, the AIB dummy variable, the uncertainty variable $UNCERT$ and the two variables \dot{W} and $EMPS$. Thus, we have

$$(2) \quad L^* = \alpha + \beta DAIB + \sum_{i=1}^n \gamma_i SIC_i + \delta UNCERT + \epsilon \dot{W} + \zeta EMPS$$

In order to take account of the possibility that actual contract length may adjust to the desired level over time,⁵⁵ the partial adjustment mechanism (3) was hypothesized,

$$(3) \quad L = \eta L^* + (1-\eta) PL,$$

where L is the current and PL the past length of contract (in months) and the constant $0 < \eta \leq 1$. A stochastic version of the equation that obtains when (2) is substituted in (3) was estimated using OLS⁵⁶ and non-linear parameter constraints designed to unscramble the basic parameters (i.e., $\alpha, \beta, \gamma, \delta, \epsilon, \zeta$ and η) and the standard errors of the model.

This is equation (4) below:

$$(4) \quad L = \eta\alpha + \eta\beta DAIB + \eta \sum_{i=1}^n \gamma_i SIC_i + \eta\delta UNCERT + \eta\epsilon \dot{W} + \eta\zeta EMPS + (1-\eta) PL + \mu$$

⁵⁴The pre-AIB and AIB sample of observations used in this study differs somewhat from the samples used in earlier work because all contracts signed by the same employer were merged and treated as one contract.

⁵⁵Adjustment costs may arise if union leaders find it hard to sell new contract lengths to the membership at large. The alternative interpretation of PL as a measure of relevant bargaining unit characteristics and transactions costs yield results which are similar to those in Tables 17 and 18 below.

⁵⁶It must be recognized that contract duration is but one of a number of issues addressed in each labour contract. Other obvious items are the degree of wage indexation, the non-contingent increase in base and other wage rates, as well as a host of other issues pertaining to labour/management relations. What is ideally required is a system of equations explaining all these variables. In light of the fact that very little work has been done in this whole area, however, the present single-equation approach is reasonable. Further research on the joint determination of contract duration and the degree of wage indexation is under way, but, in the meanwhile, separate equations are estimated for indexed and unindexed contracts in the public and private sectors.

Tables 17 and 18 present results based on equation (4) for the private and public sectors respectively. Each sub-sector set of contracts was used to estimate equations with and without the AIB dummy variable as well as the variables \dot{W} and EMPS.⁵⁷

The results presented in Tables 17 and 18 are very encouraging. Considering the micro nature of the dependent variable, the fit is good and most variables have the expected signs. The partial adjustment coefficient has reasonable values which range from 0.451 (public sector indexed contracts) to 0.719 (public sector unindexed and private sector indexed contracts), indicating a rather rapid response of actual to desired contract lengths.

The uncertainty variable coefficient is always significantly lower than zero, indicating that, as inflation uncertainty increases, contract duration declines. This is the result discussed so extensively in the survey of the literature above. It is also interesting that this effect is quantitatively strong. As UNCERT increases from its low point (4.66 in 1970Q3) to its high point (6.05 in 1976Q3), contract duration declines range from 3.7 months $((6.05 - 4.66) \times -2.682)$ in the case of public sector unindexed contracts to 22 months in the case of public sector indexed contracts.⁵⁸ One noteworthy result is that heightened uncertainty has a greater impact on indexed contracts.⁵⁹ This is somewhat surprising, as it would appear that the variance of profit is likely to be smaller when wage rates are, at least partially, indexed. Finally, the impact of increased uncertainty is seen to be greater in the case of private sector unindexed⁶⁰ contracts than comparable public sector contracts. This differential effect may arise from the somewhat easier access, afforded to public sector employers, to discretionary revenues.

⁵⁷The expected rate of inflation, which is collinear with UNCERT, was not significant.

⁵⁸It should be pointed out, however, that the public sector COLA contract equation is not likely to be reliable because of the small number of contracts involved.

⁵⁹Quite the opposite result was obtained by Christofides and Wilton (1982) who used a much smaller private sector sample. It must be recognized, though, that the coefficients in the preferred columns 2 and 5, Table 17, are not very different, while the results for the public sector COLA contracts are not reliable due to the fact that the sample size is small.

⁶⁰The results on public sector indexed contracts are discounted, see footnote 58.

TABLE 17
THE PRIVATE SECTOR
THE DETERMINANTS OF CONTRACT LENGTH, 1966Q4 - 1981Q3

(|t| STATISTICS IN PARENTHESES)

	NO COLA #OBS = 3,756			COLA #OBS = 1,177		
Constant	60.950 (28.70)	46.698 (17.32)	44.243 (15.98)	78.299 (13.23)	58.195 (8.21)	78.094 (11.99)
η	0.652 (45.57)	0.647 (45.61)	0.623 (44.70)	0.719 (24.77)	0.710 (24.69)	0.746 (27.47)
UNCERT	-7.255 (18.60)	-4.401 (8.58)	-2.898 (5.39)	-9.742 (9.28)	-5.952 (4.64)	-8.070 (6.99)
PR SIC1	2.346 (2.46)	2.194 (2.30)	2.888 (2.97)	0.509 (0.24)	1.007 (0.48)	2.896 (1.53)
PR SIC2	2.609 (3.01)	2.769 (3.20)	2.837 (3.23)	3.644 (2.87)	3.177 (2.49)	1.950 (1.69)
PR SIC3	2.004 (5.56)	1.887 (5.24)	1.662 (4.48)	4.361 (5.90)	4.416 (5.96)	2.740 (4.00)
DAIB		-4.681 (8.42)	-6.120 (10.53)		-4.748 (5.00)	-4.480 (5.30)
W			-0.479 (12.98)			-0.666 (11.98)
EMPS			-0.000 (1.26)			-0.000 (1.48)
SEE	6.677	6.613	6.446	7.323	7.243	6.797
\bar{R}^2	0.277	0.291	0.326	0.210	0.227	0.319

The SIC dummy variables indicate some cross-sectional variability in contract duration. For instance, in the private sector, the longest contracts appear in mining, where the average duration is 2.609 months longer than that in industries, such as transportation, which form the basis of comparison. Many of these SIC dummy variables are statistically significant.

TABLE 18

THE PUBLIC SECTOR

THE DETERMINANTS OF CONTRACT LENGTH, 1966Q4 - 1981Q3

(|t| STATISTICS IN PARENTHESES)

	NO COLA #OBS = 2,906			COLA #OBS = 289		
Constant	45.927 (21.51)	34.991 (12.49)	35.769 (12.51)	256.49 (8.97)	117.104 (3.74)	129.670 (4.48)
η	0.716 (40.49)	0.719 (40.87)	0.686 (39.59)	0.451 (11.18)	0.455 (11.99)	0.484 (13.59)
UNCERT	-5.405 (13.88)	-3.258 (6.17)	-2.682 (4.96)	-40.793 (8.12)	-15.118 (2.68)	-15.821 (3.09)
PUSIC1	-0.797 (1.97)	-1.015 (2.52)	-1.106 (2.70)	-0.491 (0.24)	-2.261 (1.15)	-3.265 (1.89)
PUSIC2	4.064 (8.81)	3.848 (8.40)	4.843 (10.17)	-0.439 (0.15)	0.454 (0.17)	-0.827 (0.35)
PUSIC3	3.058 (5.86)	2.918 (5.64)	2.288 (4.25)			
PUSIC4	2.738 (4.64)	2.598 (4.44)	2.622 (4.32)			
DAIB		-2.587 (5.92)	-3.763 (8.18)		-19.648 (5.53)	-19.993 (6.46)
\dot{W}			-0.346 (11.85)			-0.893 (5.37)
EMPS			0.000 (0.51)			0.004 (3.43)
SEE	5.608	5.575	5.420	7.140	6.714	6.191
\bar{R}^2	0.257	0.266	0.306	0.560	0.611	0.669

The AIB dummy variable has the expected negative sign and is significant, indicating that contract duration did in fact decline during the period of controls. In the private sector this decline is approximately five months. In the public sector the impact ranges from about three months for unindexed contracts to some 19 months in the case of COLA contracts. While the latter figure seems rather large, the reader is reminded that the decline in mean contract length registered in column four, Table 11, is, at 13 months, not much lower.

The \dot{W} variable is consistently negative and significant. This result is contrary to the Gorbet (1968) and Samlalsingh (1968) conjectures. It is conceivable that this variable, which peaks during the high inflation uncertainty period, is standing in as yet another proxy for uncertainty. This is consistent with the fact that in three out of the four sub-sectors, the coefficient on UNCERT declines when \dot{W} is included in the equations.

Finally, the EMPS variable has a very small coefficient, changing signs, and is almost never significant.

The results so far provide some evidence that contract length varies across industrial activities and this may reflect the existence of differential transaction costs. However, this traditional explanation of contract length must be supplemented by a new variable, namely inflation uncertainty. The data provide clear and convincing evidence that contract lengths decline as inflation uncertainty increases. Finally, there is clear statistical evidence that contract duration shortened during the period of controls. These conclusions hold in all sub-sectors, a fact which tends to strengthen our belief in their general validity.

It is particularly noteworthy that the equations in Tables 17 and 18 are able to distinguish a separate influence on contract duration stemming from increased uncertainty, following the oil shock of 1973 and the advent of controls in 1975Q4. This is important as these "shocks" were largely coincident. The results suggest that controls had, roughly speaking, about the same impact on contract duration as would be induced by an increase in inflation uncertainty from its minimum to its maximum value. Thus, controls are seen to have exerted a very powerful impact on contract duration.

SECTION SEVEN

SUMMARY AND POLICY IMPLICATIONS

Canadian wage contract practices, similar though they are to those in the U.S., differ from what is found in other countries in at least two respects. Wage contracts are staggered and they are of fairly long duration.

The duration of Canadian wage contracts increased to its present mean of about two years during the 1950s. Significant differences in contract length can be found between various sectors of the economy. Public sector contracts are of shorter duration than private sector ones, and unindexed contracts are of a shorter term than indexed ones.⁶¹ Within each sub-sector, e.g., private unindexed contracts, the duration of wage agreements varies considerably.

The rather dramatic increase in contract duration that occurred during the 1950s has, to a large extent, been attributed⁶² to the increased incidence of COLA clauses during that period. However, the two earlier studies of this period did not rule out the possibility that all contracts, including unindexed ones, increased in duration. The behaviour of contract duration before 1966, the date when our sample begins, lies outside the scope of the present study. It is clear, however, that since that date, the duration of all contracts, including non-indexed ones, has fluctuated dramatically. Contract durations began to decline during the early 1970s, reached a low plateau during the mid-1970s and increased again after 1978. One of the major tasks of this study was to explain this variation in contract duration.

The sample of individual contract agreements analyzed by the present study contains over 8,000 observations drawn from the period 1966Q4 to 1981Q3. These observations were sorted by file number to produce 1,118 private and 636 public sector wage contract chronologies of two or more contracts. These chronologies show that very few bargaining situations result in the same contract duration at all times. Agents' optimum contract duration appears to change over time depending on economic conditions and circumstances. It was the task of section six to analyze what these were.

The regression model specified in the previous section allowed contract duration to differ across major industrial classifications. These differences, which may arise from the fact that the costs of writing contracts may vary cross-sectionally, were found to be statistically significant. The size of the negotiating unit did not appear to exert any influence on contract duration. However, the annual base wage rate increase contained in each contract had a negative and statistically significant influence on contract duration. It was not clear whether this effect was

⁶¹The reader is referred to Table 8 of this study for further details.

⁶²See Gorbet (1968) and Samlalsingh (1968).

important per se or whether this variable was mimicking the behaviour of other, more important variables such as inflation uncertainty and the onset of the Anti-Inflation Board.

The latter variables were found to exert a powerful influence on contract duration and help explain its decline during the mid-1970s. Inflation uncertainty, which began to increase after 1970, always entered the contract duration equations with a negative sign and was always statistically significant at the 1 percent level. It was found that as inflation uncertainty increased from its lowest (1970Q3) to its highest level (1976Q3), it depressed contract duration in the various subsectors by amounts ranging from four to 22 months.⁶³ The sample of wage contracts examined contained observations drawn from the period of controls, 1975Q4 to 1978Q3. Though contained within the longer period of high uncertainty indicated above, the latter period saw contracts of significantly lower durations than the pre-AIB and post-AIB eras. During this period of wage controls, contract lengths in the various subsectors were significantly shorter by amounts ranging from five to 20 months.⁶⁴ This result is as robust as the inflation uncertainty one and quite independent from it. There is no doubt that the regression equations are able to distinguish two separate forces at play.

These findings suggest that agents do not follow habitual patterns in arriving at contract duration. Of all agents with four or more contracts signed during the entire sample period, only 14.3 percent invariably signed contracts of the same duration. In most instances, contract length was an obviously endogenous variable, determined jointly, no doubt, with other important labour market variables such as wage rates and benefits. These decisions may be considered optimal from the point of view of the agents involved.

The resulting economic structure will have properties which may or may not be desirable from a macroeconomic, policy maker's, point of view. The complete freedom afforded agents results in a structure of staggered contracts of varying lengths and a bargaining calendar which is not regular. The staggering of wage contracts makes the response of the economy to shocks, be they random or policy induced, smoother than would be the case were all contracts to begin and end at the same time. The average contract duration influences the time frame over which the response will occur. Thus, in an economy such as that of Japan, where contracts are not as staggered as they are in Canada and average duration is short, shocks such as the oil price increases of 1973 and 1979 should work themselves through the economic system in an abrupt, speedy fashion. By contrast, in Canada, the process has been much smoother and more protracted. The relative merits of the two systems, from a welfare point of view, are as yet unexplored.

Another aspect of this is that anti-inflation policy initiatives in an economy such as Canada's will not produce quick results. The staggering of wage contracts combined with long average contract duration spread

⁶³See Tables 17 and 18 for further details.

⁶⁴See Tables 17 and 18 for further information.

the impact of policy over a long period of time. Thus in Scarth's (1982) model, a disinflationary policy will impose immediate unemployment costs with only a gradual reduction in the rate of inflation. It must be remembered, however, that another way of making this point is to say that in periods of excess capacity, reflationary policies will produce GNP gains well before the rate of inflation is affected. Since governments should think of themselves as being "in business" for the long run, the conclusion that policy measures must be brought forth to reduce average contract length (so that disinflationary policies can have a faster effect on inflation at a lower unemployment cost) must not be reached too hastily.

It is clear that because of the endogeneity of contract duration government intervention in any facet of the labour market will have an impact in other areas. Thus, the AIB's concern with wage settlements had a very clear effect on contract duration, an impact which was certainly not explicitly intended. This unintended effect on duration was probably beneficial, since it speeded up the impact of the disinflationary monetary policies which were put into effect at the same time.⁶⁵ In this regard, wage controls worked not only through their traditional impact on wage settlements but also through the structure of the bargaining calendar which they helped produce.

It is frequently argued that wage controls are not likely to be effective if implemented without supportive monetary and fiscal policies. The precise nature of this conjunction has never been satisfactorily spelled out. This study suggests, however, that there is a shoe on the other foot. That is, since controls appear to have shortened wage contracts, they may have accelerated the impact of disinflationary policies. This effect is quite independent of whatever effect controls may have had on the bargaining process and wage settlements. Whether wage controls should be implemented in order to speed up the response of the economy to disinflationary policies and abolished in order to slow down inflationary pressures during reflationary initiatives is an intriguing question that deserves further study.

⁶⁵Of course, the AIB impact on duration did not mean that existing contracts were shortened/opened. But it did mean that the new contract structure which gradually replaced the old one became more responsive to the disinflationary policies, which were intended to remain in effect for a long time.

APPENDIX

WAGE CHRONOLOGIES

TABLE A1(i)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: FORESTRY, FISHING AND TRAPPING; SIC 031-049

(L2; File #03100500101)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1968	9	24	1,635	NO	3:Conc Bd	5
1970	9	24	1,585	NO	3:Conc Bd	7
1972	9	24	525	NO	4:P.C. Brg	7
1974	9	24	505	YES	5:Med	6
1976	9*	24	500	YES	5:Med	6
1978	9	24	1,300	NO	5:Med	7
1980	9	24	1,150	NO	2:Conc Off	6

*Denotes an AIB-period contract.

TABLE A1(ii)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MINING AND MILLING, SIC 050-099

(L2; File #06100200201)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1966	8	12	4,190	NO	1:Brg	3
1967	8	12	4,130	NO	1:Brg	3
1968	8	12	5,000	NO	1:Brg	7
1969	8	36	5,000	NO	1:Brg	7
1972	8	29	3,030	NO	1:Brg	10
1975	1	24	3,200	YES	3:Conc Bd	7
1977	1*	12	2,760	YES	3:Conc Bd	10
1979	1	24	3,090	NO	3:Conc Bd	11

*Denotes an AIB-period contract.

TABLE A1(iii)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MANUFACTURING; SIC 100-153

(L3; File #10290000103)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1970	8	36	1,000	NO	1:Brg	1
1973	10	23	1,000	NO	2:Conc Off	6
1975	9*	16	2,300	NO	3:Conc Bd	7
1977	1*	36	1,600	NO	4:P.C. Brg	9
1980	1	32	3,600	NO	11:Wk Stop	12

*Denotes an AIB-period contract.

TABLE A1(iv)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MANUFACTURING; SIC 154-249

(L7; File #24400490201)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1969	8	36	12,500	NO	1:Brg	3
1972	8	36	10,420	NO	1:Brg	3
1976	1	36	12,000	YES	1:Brg	3
1978	8	24	12,000	NO	2:Conc Off	4
1980	8	36	11,000	YES	1:Brg	5

TABLE A1(v)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MANUFACTURING; SIC 250-289

(L5; File #27109401103)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1968	5	24	700	NO	2:Conc Off	8
1970	5	36	835	NO	2:Conc Off	8
1973	5	24	925	YES	2:Conc Off	9
1975	5*	36	640	YES	11:Wk Stop	12
1978	5	24	2,415	NO	2:Conc Off	6
1980	5	24	2,900	NO	1:Brg	6

*Denotes an AIB-period contract.

TABLE A1(v1)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MANUFACTURING; SIC 290-359

(L4; File #29509400101)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1969	2	36	4,550	NO	1:Brg	4
1972	3	12	4,405	NO	2:Conc Off	6
1973	8	33	5,015	NO	11:Wk Stop	8
1976	11*	35	5,015	NO	11:Wk Stop	10
1979	9	17	7,260	YES	11:Wk Stop	7
1981	2	35	6,805	YES	1:Brg	2

*Denotes an AIB-period contract.

TABLE A1(vii)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: MANUFACTURING; SIC 360-399

(L1; File #37800501001)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1968	8	23	1,750	NO	3:Conc Bd	6
1970	7	14	1,750	NO	2:Conc Off	5
1971	9	24	1,600	NO	2:Conc Off	4
1973	10	29	1,550	NO	4:P.C. Brg	5
1976	3*	12	1,530	NO	11:Wk Stop	4
1977	3*	12	1,530	NO	5:Med	4
1978	3*	12	1,550	NO	1:Brg	3
1979	3	24	1,530	NO	1:Brg	3
1981	3	24	1,600	NO	1:Brg	4

*Denotes an AIB-period contract.

TABLE A1(viii)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: TRANSPORTATION; SIC 500-524

(L4; File #50109000105)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1969	1	26	6,300	NO	11:Wk Stop	8
1971	3	25	6,200	NO	5:Med	9
1973	3	24	6,990	NO	2:Conc Off	7
1975	4	24	7,250	NO	1:Brg	4
1977	4*	12	7,250	NO	1:Brg	3
1980	3	24	7,990	NO	1:Brg	4

*Denotes an AIB-period contract.

TABLE A1(ix)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: STORAGE, COMMUNICATION AND OTHER UTILITIES;
SIC 524-599

(L2; File #54409000203)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1967	12	12	10,000	NO	1:Brg	2
1968	12	12	9,105	NO	1:Brg	3
1969	11	12	9,655	NO	1:Brg	3
1970	11	12	9,655	NO	1:Brg	3
1971	12	12	10,350	NO	1:Brg	4
1972	12	12	10,575	NO	1:Brg	4
1973	12	12	11,240	NO	1:Brg	3
1974	11	12	12,730	NO	1:Brg	6
1975	12*	12	5,852	NO	1:Brg	5
1976	12*	12	6,946	NO	1:Brg	3
1977	12*	12	7,580	NO	1:Brg	4
1978	12	12	16,300	NO	1:Brg	2
1979	12	12	16,600	NO	1:Brg	5
1980	12	12	17,000	NO	1:Brg	3

*Denotes an AIB-period contract.

TABLE A1(x)

PRIVATE SECTOR

CONTRACT CHRONOLOGY: TRADE, FINANCE, ETC. AND SERVICES; SIC 600-899

(L2; File #63100990101)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1967	4	24	3,400	NO	3:Conc Bd	12
1969	4	24	3,200	NO	11:Wk Stop	6
1971	4	24	5,600	NO	2:Conc Off	5
1973	4	24	6,800	NO	1:Brg	5
1975	4	23	3,600	NO	12:P.S. Brg	9
1977	4	12	3,200	NO	1:Brg	4
1979	4	24	4,100	NO	1:Brg	8
1981	4	24	9,215	NO	2:Conc Off	7

TABLE A2(1)

PUBLIC SECTOR

CONTRACT CHRONOLOGY: EDUCATION; SIC 801-809

(L2; File #80200290601)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1976	1*	17	11,500	NO	1:Brg	2
1977	6*	14	11,370	NO	1:Brg	3
1978	8	12	11,000	NO	1:Brg	3
1979	8	24	11,500	NO	2:Conc Off	8
1981	8	24	11,500	NO	1:Brg	3

*Denotes and AIB-period contract.

TABLE A2(1f)

PUBLIC SECTOR

CONTRACT CHRONOLOGY: HEALTH AND WELFARE; SIC 821-828

(L2; File #82100905391)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1970	1	24	5,000	NO	2:Conc Off	4
1972	1	24	5,500	NO	6:Med Comm	7
1974	1	24	5,500	YES	5:Med	8
1976	1*	24	8,000	YES	2:Conc Off	15
1978	1*	24	8,000	NO	9:Arb	9
1980	1	27	12,500	NO	5:Med	9

*Denotes an AIB-period contract.

TABLE A2(111)

PUBLIC SECTOR

CONTRACT CHRONOLOGY: FEDERAL; SIC 902-909

(L1; File #90909000233)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1969	10	12	32,670	NO	1:Brg	3
1970	10	34	31,770	NO	9:Arb	13
1973	7	28	46,525	NO	5:Med	9
1976	3*	12	46,260	NO	1:Brg	6
1977	2*	12	46,780	NO	1:Brg	6
1978	9	24	52,620	NO	4:P.C. Brg	11
1980	10	24	48,870	NO	11:Wk Stop	14

*Denotes and AIB-period contract.

TABLE A2(1v)

PUBLIC SECTOR

CONTRACT CHRONOLOGY: PROVINCIAL; SIC 931

(L7; File #93100700101)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1967	10	24	5,000	NO	1:Brg	7
1969	10	24	5,000	NO	3:Conc Bd	8
1971	10	24	5,400	NO	1:Brg	2
1973	10	24	6,500	NO	1:Brg	6
1975	10*	12	8,000	NO	1:Brg	8
1976	10*	12	15,500	NO	1:Brg	11
1979	10	24	12,000	YES	4:P.C. Brg	10

*Denotes an AIB-period contract.

TABLE A2(v)

PUBLIC SECTOR

CONTRACT CHRONOLOGY: LOCAL GOVERNMENT; SIC 951

(L1; File #95100400201)

Effective Date		L (months)	Employees	COLA	Settlement Stage	Duration of negotiations (months)
1966	12	12	5,300	NO	11:Wk Stop	5
1967	12	25	6,000	NO	1:Brg	3
1970	1	24	7,500	NO	2:Conc Off	4
1972	1	24	8,000	NO	11:Wk Stop	8
1974	1	24	8,000	NO	2:Conc Off	7
1976	1*	12	7,000	NO	2:Conc Off	7
1977	1*	12	8,000	NO	2:Conc Off	10
1980	1	24	5,600	YES	13:Other	12

*Denotes and AIB-period contract.

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